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RECENT PROGRESS IN MEDICAL ZOOLOGY.—PART II.

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The first part of this review, which appeared in Vol. 18 of the *Bulletin*, dealt exclusively with medical entomology ; the present and concluding part takes in several other matters of a combined medical and zoological interest that are not definitely included in other sections of the *Bulletin*.

1. *Protozoon Parasites of the Intestine.*

Recent work on the intestinal protozoa of man has certainly modified our conceptions of the pathological significance of parasites and has also helped to clarify our definitions of the term " tropical disease," since it has very clearly disclosed the facts that certain protozoon parasites—in particular *Entamoeba histolytica*—long supposed to hold a distinctive place in tropical pathology, are neither peculiar to the tropics nor unconditionally pathogenic. The first of these propositions, foreshadowed by SMITH and MATHEWS and other investigators at Liverpool, was soon followed up in other places outside the tropics, and has been fully discussed and brought into prospective by DOBELL in a Special Report to the Medical Research Council. In this report (Vol. 18, p. 33*) a mass of evidence is collected from many sources showing that—quite apart from any question of imported " carriers " from the tropics—infections with *E. histolytica* (as of other intestinal protozoa) are quite common among natives of Great Britain and other countries of Western Europe, who have never had any connexion or communication with foreign parts. The evidence collected in this report shows also that these indigenous infections of temperate countries, though, quite occasionally, they may become manifest in all the typical signs and symptoms of amoebiasis, are usually innocuous and unsuspected, the infected individuals being to all appearance perfectly healthy. We are justified in concluding, therefore, that *Entomoeba histolytica* is a parasite that only becomes pathogenic in certain circumstances. What those circumstances are is a matter of much easy speculation, but it seems sure enough that they concur oftener in than outside of the tropics. DOBELL, it is true, does not approve this simple and logical conclusion, but assumes that *E. histolytica* is always pathogenic in action, though not necessarily to clinical observation. He thus appears to regard the amoeba, when unsuspected and clinically negligible in an apparently normal individual,

* References are to summaries in the *Tropical Diseases Bulletin*, unless otherwise stated.

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in the same light that a physician regards a compensated organic lesion—a view decidedly strained. More important than speculations of this sort is the recognition of the danger to a community of these multitudes who are harbouring the amoeba and passing its cysts in their faeces, and of the slur cast upon the sanitary moral of the community by the existence of these individuals in such numbers. Philosophers who descry in the dreadful god of battle the quickening spirit of human progress, may comfortably reflect that all this exact knowledge of the dysentery amoeba was one of the many outcomes of the Great War.

The general study of the intestinal protozoa of man, stimulated by the conditions of active military service, has been greatly helped by WENYON's instructive " Observations " on the subject, published in the *Lancet* of November 27, 1915 (Vol. 7, p. 231). More recently it has been still further facilitated by the work of DOBELL, who, in his latest publication, planned in collaboration with O'CONNOR (Vol. 18, p. 413), has defined and mapped the whole field, clearly described its particular natural features, traced the footsteps of its previous explorers, and marked all its roads and its pitfalls. A clear distinction is here drawn for the first time between the true intestinal fauna, the elements of which are naturally passed in the faeces, and the accidental and delusive fauna of the faex itself—the coprozoic protozoa. The former are inhabitants of the intestine ; the latter, of which four species of Rhizopoda and eight species of Flagellata are considered worthy of notice by DOBELL, either get into the faeces, as they commonly get into organic infusions and decomposing organic matter in general, by reason of their ubiquity, or may be derived from swallowed cysts that have passed through the gut unchanged and have ultimately been hatched in the discharged faeces. Of the protozoa whose proper natural habitat is the human intestine, seventeen species are recognized by DOBELL and O'CONNOR, namely five Amoebae, seven Flagellata, four Coccidia, and three Ciliata, of which two (*Balantidium minutum* and *Nyctotherus faba*) have but seldom been observed. How many of these —beyond *Entamoeba histolytica* and *Balantidium coli*, and perhaps *Giardia intestinalis*—are harmful to man, and how far they are harmful, are much debated questions. DOBELL appears to regard all the Flagellata —even Giardia—as harmless. WENYON (Vol. 16, p. 93), who took advantage of a good opportunity of systematically investigating a good deal of post-mortem material that chanced to be infected with Trichomonas and Chilomastix, did not find any lesions that could be attributed to them, although in one case he observed Trichomonas in the connective tissue between the Lieberkuhnian follicles. As regards the Coccidia, a recent paper by HAUGHWOUT (Vol. 19, p. 105) contains a good account of a case of human coccidiosis and references to other cases ; the symptoms in HAUGHWOUT's case, which was under observation for more than four months, were abdominal discomfort, lassitude, loss of appetite, and occasional nausea and watery diarrhoea, with passage of oocysts and shed epithelial cells. In view of the dogmatic statements so often met with regarding the morbific significance of the intestinal protozoa of man, it does not seem unreasonable to commend to disputants on this subject the following passage from the Leviathan of that sound philosopher, Thomas HOBBES, of Malmesbury :—

" As in Arithmetique unpractised men must and Professors themselves may often erre and cast up false, so also in any other subject of Reasoning the ablest, most attentive, and most practised men may deceive themselves

and inferre false conclusions. Not but that Reason itselfe is alwayes Right. Reason, as well as Arithmetique is a certain and infallible Art. But no one man's Reason, nor the Reason of any one number of men, makes the certaintie ; no more than an account is therefore well cast up because a great many men have unanimously approved it. And therefore, as when there is a controversy in an account, the parties must by their own accord set up for right Reason the Reason of some Arbitrator, or Judge, to whose sentence they will both stand, or their controversie must either come to blowes, or be undecided, for want of a right Reason constituted by Nature, so is it also in all debates of what kind soever. And when men that think themselves wiser than all others clamor and demand right Reason for judge, yet seek no more but that things should be determined by no other men's reason but their own, it is as intolerable in the society of men as it is in play, after trump is turned, to use for trump on every occasion that suite whereof they have most in their hand."

In the first part of this review (Vol. 18, p. 8) reference has been made to the subject of carriage of intestinal protozoa by flies, and to the interesting experiments made by ROOT (*tom. cit.*, p. 16) in confirmation of those of numerous other observers. Other matters worthy of reiteration are O'CONNOR's observations (Vol. 15, p. 206) of many and strange individual inclusions in *Entamoeba coli*, among the inclusions noticed being cysts of *E. histolytica*, Giardia, and Chilomastix, free Giardia, and oocysts of *Isospora hominis*. The same patient observer has also found *Iodamoeba* infesting pigs in Funafuti, and this observation has been so well confirmed in France that CAUCHEMEZ (Vol. 19, p. 25) is inclined to regard this amoeba as being, like *Balantidium coli*, habitually a parasite of the pig. Mention must certainly be repeated of DOBELL's learned paper (Vol. 16, p. 89) proving by several satisfactory lines of argument that the illustrious Antony VAN LEEUWENHOEK (1632–1723) was the original discoverer of parasitic protozoa, he having fully reported (1681) the detection in his own stools, with lenses of his own manufacture, of the "prettily moving animalcules, some rather larger, others somewhat smaller, than a blood corpuscle," now known as *Giardia intestinalis*. A less pleasing topic is discussed in a paper by WENYON (Vol. 19, p. 19), where sufficiently convincing proof is offered that CHATTERJEE's "new" *Entamoeba paradysenteria* is nothing but a name for a degenerate *E. histolytica*, and that the "new" genus and species *Councilmania lafleuri* of KOFOID and SWEZY is none other than *Entamoeba coli*, the extraordinary "budding" of whose cysts is an illusion due to the simple accident of rupture. DOBELL's criticism (Vol. 18, p. 410) of the treatise on the Flagellata of the digestive tract by KOFOID and SWEZY consigns "Craigia" and "Craigiasis" to perdition.

II. *Protozoon Blood-Parasites.*

Some work of unusual significance has recently been published that may help to elucidate the mystery of dormant malaria. First may be mentioned WHITMORE's observations on bird malaria (Vol. 13, p. 65) to the effect that the blood of infected canaries remains infective by injection for at least 29 months after parasites have ceased to be discoverable in the circulation—29 months being no fixed limit, but merely the limit of the author's opportunities of experiment. Etienne SERGENT (Vol. 17, p. 101) has confirmed this fact of persistent infectivity after disappearance (or at least occultation) of parasites, while increasing its practical significance, by demonstrating that the birds' blood in these circumstances is infective to Culex—a revolutionary

discovery. In another direction J. D. THOMSON (Vol. 11, p. 1) has cleared away SCHAUDINN's misleading hypothesis of parthenogenesis of the Plasmodium gametocyte by a convincing demonstration that the supposed schizogametocyte is merely an instance of that not very rare phenomenon—a schizont and a gametocyte intimately enclosed in the same red blood corpuscle. THOMSON strengthens his case—if repeated demonstration of simple fact require support—by the very apt argument that as parthenogenesis, by universal acceptance, can only imply that a virgin ovum completes a predetermined course of evolution exactly as if it were a fertilized ovum, the progeny of a Plasmodium macrogamete must, under any supposed circumstances, be a swarm of sporozoites, not a mass of young trophozoites.

GILL (Vol. 18, p. 328) has published some suggestive observations on the combined influence of moisture and temperature on the development of malaria parasites in mosquitoes. The experiments of MITZMAIN and of WENYON on the history of malaria parasites in hibernating mosquitoes, and those of MAYER and MÜHLENS on instances of generalized sporozoite-infection in Culex and Anopheles have been noticed in the first part of this review (Vol. 18, p. 3).

The antecedent origins of blood-parasites is a subject so fascinating and seductive that no one should write about it without having some halfpenny-worth of fact to set against his liquid speculation. That a given blood-parasite may have had somewhere some antecedence in an intestinal parasite is a reasonable hypothesis, but REICHENOW (Vol. 17, p. 98) appears to think that he has found evidence of a specific intestinal Trichomonad of lizards spreading freely from the intestine to the tissues and the blood of its host and subsequently being transferred from the blood of one individual host to the gut of another by the mediation of a mite. This seems to be an unnecessarily devious path for the evolutionary change from intestinal parasite to blood parasite. That parasites whose ordinary habitat is the intestine (or whose mode of entry is by the intestinal tract) can get into the tissues and the blood stream, and that parasites whose ordinary habitat is the blood can get into the tissues is, of course, nothing unfamiliar.

A good many papers have appeared within the last few years on the flagellates of plants—chiefly Euphorbias, but also an Asclepiad—with suggestions that this may be a natural source of insect infection. LAVERAN and FRANCHINI (Vol. 18, p. 187) claim to have also infected white mice with latex of a Euphorbia naturally infected with Leptomonas and to have subsequently found leishmaniform parasites in the blood of the mice that survived the experiment. On the other hand, FRANÇA (Vol. 17, p. 100) did not succeed in infecting laboratory animals direct from latex infected with Leptomonas.

As regards modes in which a given infection may be spread, it has been stated that certain species of Trypanosomes can find their way into the milk of their mammalian host, and LANFRANCHI has recorded (Vol. 17, p. 335) the results of a series of experiments from which he concludes that it is possible for sucklings thus to get infected from their mother. Several papers have been published on the question of the natural mode of transmission of Sarcosporidia, and attention may again be directed to SERGENT'S suggestion (Vol. 19, p. 108) of the intermediation of a blood-sucking arthropod, this suggestion arising out of the discovery of a number of spores resembling those of *Sarcocystis blanchardi* in the peripheral blood of a calf, the spores being of two kinds, suggestive of a sexual difference. Another mode

of transmission of sporozoan parasites is conjectured by GUYENOT and NAVILLE (Vol. 17, p. 102); in the stomach of grass snakes, which were infected as to their dorsal muscles with small white tubules stuffed with sporoblasts and spores, they found trematodes similarly infested, the ovaries of the trematodes being suggestively involved in the spore infection.

A minor matter worthy of mention is the discovery by SWELLENGREBEL (Vol. 18, p. 195) of a Haplosporidian parasite in the stomach of *Anopheles indefinitus*, since misleading cysts of a very similar parasite occur in *Anopheles maculipennis*.

III. *Snake-bite and Snake-venom.*

In this subject the masterly essay by Hugh ACTON and R. KNOWLES, published in the *Indian Journal of Medical Research* for July 1914 and October 1915, under the title "Studies on the Treatment of Snake-bite" (Vol. 9, p. 237) will undoubtedly rank as a classic, both from the scientific and from the utilitarian standpoint. Based on intelligent experiment, concise and coherent in argument, and luminous in its practical applications, it is a model of critical research. It begins with an analysis of all the terms involved in the proposition "Effective bite from a venomous (Indian) snake," namely, the mechanism of the given bite, the potency of the specific venom, the estimate of the minimum lethal dose of that venom for man, and the estimate of the number of doses discharged in an effective bite. Thus we start—perhaps for the first time—with some clear definitions indispensable for prognosis. Mechanical treatment is next considered —ligature and amputation, besides other questionable methods—and from ample experiment it is shown that an efficient ligature, applied immediately, may save life, particularly in cases of viper bite, and at any rate gives time for the operation of other remedies. The value of local remedies is then discussed—permanganates, gold chloride, and iodine chloride—and the authors' experiments show that if these can be injected hypodermically in the vicinity of the bite (10 cc. of a 5 per cent. solution of gold chloride being the most effective) before a lethal dose of venom has been absorbed, life can be saved. Thus a monkey recovered, which, after receiving 25 lethal doses of cobra venom, had been adequately ligatured within three minutes and locally injected with 10 cc. of 5 per cent. gold chloride solution when the ligature was removed twenty minutes afterwards. The nature and action of venoms and antivenoms, and the aspects of anti-venene therapy are then considered, and finally the essence of this comprehensive and connected series of experiments is distilled for practical every-day use.

Of papers of a more purely scientific interest those of HOUSSAY, NEGRETTE and SORDELLI (Vol. 16, p. 116) embody the results of a remarkable amount of experimental work on the chemical and physiological action of the venom of numerous notorious American, Asian, and Australian snakes, including *Lachesis*, *Ancistrodon*, *Crotalus*, *Elaps*, *Naja*, *Bungarus*, *Vipera*, *Echis*, *Notechis*, and *Pseudechis*. Among other things the diastatic, amylolytic, lipolytic, lecithinasic, and proteolytic action of these venoms, has been studied, and their specific action on the blood in vitro and in vivo. As regards the action on the blood, these authors distinguish between coagulant and anticoagulant venoms. The coagulant venoms clot the blood, immediately or gradually according to the dose injected, the clotting being directly due to precipitation of fibrinogen; this is their "positive

phase," which is succeeded, quickly or gradually according to dose, by a "negative phase," when, as a consequence of the complete precipitation of its fibrinogen the blood becomes incoagulable. The anticoagulant venoms impede coagulation (unless they also contain specific thrombine, which masks this action) not by formation of antithrombin or by any interference with fibrinogen, but by direct destruction of cytozyme.

Another interesting contribution to our knowledge of snake venom is contained in a paper by GUNN and HEATHCOTE (Vol. 18, p. 31) on Cellular Immunity. It is there shown by experiments in which the heart-muscle and intestine of warm-blooded animals are selected for observation, that "immunity" to cobra venom, both natural and as acquired by antitoxin, is to be considered as in part a cellular immunity of tissues.

IV. *Other Animal Venoms.*

The toxin of the well-known Indo-Pacific Siluroid Fish, *Plotosus anguillaris*, has been located by KABESHIMA (Vol. 16, p. 120) in cutaneous cysts at the base of the great defensive spines of the dorsal and pectoral fins [these cysts are probably temporary dilations of the ordinary mucous glands of the skin] EVANS (*tom. cit.*, p. 121) describes the venom glands of the dorsal spines of the piked dogfish. MATSUSAJI and KABEDA (*tom. cit.*, p. 119) deal in much detail with the action and reactions of the cutaneous venom of the salamander, *Triton pyrrhogaster*. ALLEN (Vol. 18, p. 208) has given an interesting account of the effects of contact with an unspecified "jellyfish": the local effects were intolerable irritation of the skin, followed by profuse weeping eczema, and the generalized effects were manifested immediately in severe coryza succeeded by acute and persistent inflammation localized in the larynx.

NAKANO (Vol. 13, p. 381) has recorded some investigations of the poisonous properties of a crab and lobster not precisely specified; he found that the filtrate of an emulsion of the liver—both of the raw and of the boiled liver—was poisonous to mice, although heating of the filtrate itself rendered it harmless. ISHIHARA (Vol. 16, p. 120) describes some chemical reactions of the poisonous flesh of a parrot fish (Tetrodon).

V. *Miscellanea.*

ROUBAUD'S enthusiastic advocacy (Vol. 16, p. 103) of domestic animals as the ideal preventive of malaria in places where the insect-host of the parasite is *Anopheles maculipennis* may be mentioned here. According to ROUBAUD this insect, if it have free and frequent access to cattle, will have nothing to do with man; given a perfectly free and equal choice between cattle and man, it will not touch the nobler animal. ROUBAUD has now carried his argument to such an extremity of precision that among insects of this species he claims to distinguish, by the number of the minute maxillary serrations, those that are man-eaters from those that are cattle-eaters; so far as his observations go at present the number of serrations in the former is 13 to 14, in the latter 14 to 14·9. He even proposes that in places where, owing to insufficiency or to imperfect distribution of cattle, the local race of *Anopheles maculipennis* is not properly modified for an exclusive diet of cattle, the question of introducing a stock of insects possessing the necessary modification might be considered with a view to accelerating the general modification. Even if the facts supported the conclusions the conclusions would not justify the proposal.

MALARIA.

WENYON (C. M.). **The Incidence and Aetiology of Malaria in Macedonia.**—*Jl. Roy. Army Med. Corps.* 1921. Sept. Oct. Nov. Vol. 37. Nos. 3, 4 and 5. pp. 172–192. With 2 charts and 9 figs.; 264–277; 352–365. With 5 plates and 2 text figs.

In the first part of this paper (this *Bulletin*, Vol. 18, p. 326) it was shown that the main malaria carriers in Macedonia are *Anopheles maculipennis* for the valleys and *A. superpictus* for the hills. In both species hibernation is, at least mainly, by large, healthy, corpulent females with undeveloped ovaries. Their favourite shelter is a barn with a buffalo combining the functions of central heater and food purveyor, for hibernation is usually relative only. Certainly if the temperature fall very low the mosquito becomes entirely inactive, but if the buffalo function adequately as a stove, anything up to 40 per cent. of the mosquitoes accept it, or any human being entering the byre, as a food purveyor, and avail themselves of any sunny weather for an outing. After vernal oviposition, and in equally suitable conditions, parasitic maturity is reached sooner in *A. maculipennis* than in *A. superpictus*, while in nature the normal habitat of the former in the warmer valleys increases this disparity; so that valley malaria appears earlier in the year than does hill malaria. Among wild mosquitoes dissected during the winter months, 7 contained gastric oocysts. Experiments were accordingly initiated to test the possibility of winter hibernation of malarial parasites in Anopheles. Of 4 *A. maculipennis* and 20 *A. superpictus* fed on two crescent carriers, all of the former and 15 of the latter became infected. If, however, infected mosquitoes were placed in an ice chest at a temperature between 9° and 12° C., oocysts already formed degenerated in every case. If, however, the temperature were only lowered to that of the laboratory, development ceased, only to be resumed a fortnight later when the mosquitoes were placed in the incubator. These conclusions were, of course, reached by sacrificing a proportion of the mosquitoes in question, and indicate that under certain conditions the carriage of malaria through the winter by the mosquito is a possibility.

The malarial parasites found in Macedonia conform to the normal appearance, so that the unusual virulence of malaria there is not attributable to any unusual species. Wenyon's explanation of this has been dealt with in the critical summary (this *Bulletin*, Vol. 19, p. 93 *et seq.*), as has his opinion that there is no justification for SCHAUDINN's teaching of gametocytic parthenogenesis, and that the schizont of *Plasmodium vivax* is more quinine-resistant than that of *P. falciparum*, so that *P. vivax* survives in outstanding degree in the individual over the winter and so gives rise to the spring epidemic of benign tertian malaria, but that the gametocytes of *P. vivax* are emasculated by quinine, so that they cannot infect mosquitoes.

As an instance of the possible latency of malaria is adduced the case of a man who had his first attack six months after reaching England, and winter malaria is explained by latent infestations first evidencing themselves at that season.

As Wenyon points out, the various factors already mentioned co-ordinate themselves into an explanation of the seasonal incidence of the malarias more reasonable than the unzoological suggestion that mutability of species occurs. Owing to the resistance to quinine of

the asexual phase of the benign tertian parasite, and the general cessation of quinine ingestion during the winter months, the year starts, north of the equator, with many more carriers of *P. vivax* than of *P. falciparum*, and mosquitoes become correspondingly infected. As symptoms appear and quinine is consumed, the gametocytes of *P. vivax* are rendered impotent while those of *P. falciparum* are not. Then, too, the gametocytes of the latter are apt, in heavy infections, to be much more numerous than those of the former, so that, as the year passes, mosquitoes become steadily more highly infected with malignant tertian malaria and transmit it to man in increasing degree, and by autumn it is the prevalent infestation. This suggestion of Wenyon's regarding the seasonable prevalence of malaria in those taking quinine will require correlation with Greig Anderson's (p. 295) observation on the tertian parasite's seasonal resistance to quinine.

In blackwater fever malarial parasites were common, and quinine was given in all such cases. The mechanism of these cases is looked upon as involving the same method of blood destruction as occurs in malarial fever, but in exaggerated degree, their severe symptoms being attributed to the excess of free haemoglobin poisoning the body in general, and damaging the kidneys in particular as these attempt to excrete it. It is suggested that quinine haemoglobinuria should be distinguishable from blackwater fever.

It is felt that intramuscular injections of quinine have their place in treatment, since, in spite of the fact that they invariably produce necrosis, one or two such injections will constantly induce oral quinine to act in cases in which it has hitherto failed to do so.

In face of our tendency to national belittlement it is well pointed out that from January to June, 1918, the British mortality in Macedonia from malaria was 0·7 per thousand, while over the same period that of the French was 6·4, a fact attributed to the thorough diagnosis and treatment rendered possible by the size of the medical and nursing staffs at our disposal.

Interesting facts are adduced regarding the optimum definitive hosts of *P. vivax* and *P. falciparum*. In *A. superpictus* these two malarial parasites developed at about the same rate. In *A. maculipennis P. vivax* develops as rapidly as it does in *A. superpictus*, while *P. falciparum* takes about a third longer; from which it may be inferred that *A. superpictus* is a more nearly optimum host for *P. falciparum* than is *A. maculipennis*.

Finally, there are valuable practical hints for the dissection of mosquitoes and the staining of malarial parasites during their varied development in their hosts. The findings confirm in the main those of Grassi. Certain acicular crystals, soluble slowly in water and instantly in acid, were seen several times in salivary glands. They so closely resemble sporozoits that the possibility of error must be emphasized.

Clayton Lane.

Ferguson (Eustace W.). **Malaria in Palestine: Experiences with a Field Laboratory.**—*Australasian Med. Congress, Trans. of the Eleventh Session held in Brisbane, Queensland, 21st–28th Aug. 1920.* pp. 310–317.

In 12,585 slides examined in thin smears from suspects, 3,788, or 30·09 per cent., were positive. Of these, 2,547 showed malignant tertian, 1,225 benign tertian, and 16 quartan parasites. The maximum

time given to a slide was four minutes, and since no double infections occur in this series, although it is noted that such were not uncommon, it may be presumed that examination ceased as soon as any kind of parasite was observed. Between six diagnosis stations, two military laboratories and the Anzac Field Laboratory, 110,000 films were examined, of which 24,000 were found positive, 14,000 being malignant and 10,000 benign infections. The parasites are described in detail.

C. L.

SERGENT (Edmond) & SERGENT (Etienne). **Etudes épidémiologiques et prophylactiques du paludisme (dix-septième, dix-huitième, et dix-neuvième campagnes en Algérie, en 1918, 1919 et 1920.)** —*Ann. Inst. Pasteur.* 1921. Nov. Vol. 35. No. 11. pp. 801–813.

This report has a value mainly local. The following, perhaps, are the facts of more general interest. There was no observed effect on malarial incidence in those places where bats, feeders on mosquitoes, were present. The ordinary flight range of Anopheles was 1,500 to 2,000 metres, but exceptionally reached several kilometres ; vertically they could rise 185 metres ; they were transported by trains ; a temperature of −10° C., continued for five months, killed their eggs. Enlarged spleen was commoner in adults than in children, in the proportion of 3–2. Prophylactic quinine was given daily in doses of 6 gr., or every other day in doses of 8. An apposite note points out the limits of value of ROUBAUD's animal-house prophylaxis. An unhappy horse was literally covered with mosquito bites one night, but this did not prevent the delivery of a simultaneous and furious attack upon the writers' mosquito nets. Similarly, the inhabitants suffer from malaria although they surround their dwellings with animal-houses to ward off, not mosquitoes, but robbers. Although the writers are satisfied that *Anopheles maculipennis* and *A. bifurcatus* var. *algeriensis* prefer pig to man, these pests show, if starving, no nice fastidiousness ; while in a Mohammedan country there is the usual difficulty with the domestication of the pig.

C. L.

FALLERONI (Domenico). **La malaria di Trinitapoli (Foggia) e l'importanza degli animali domestici nella difesa contro la malaria.** [Malaria in Trinitapoli (Foggia) and the Importance of Domestic Animals in its Prevention.]—Reprinted from *L' Igiene Moderna.* 1921. July, Aug. & Sept. Vol. 14. Nos. 7, 8 & 9. 34 pp. With 3 folding plans.

This paper deals with the medical history and topography of Trinitapoli, the experimental malarial station of Italy, but, as its title hints, its main prepossession is a natural enough claim to national priority in the matter of the value of animal-houses as protective agents against human malaria. It is postulated that for the abolition of this disease there must be that agricultural and hygienic reclamation and betterment which the Italians style "bonifica," and that an essential part of agricultural bonifica is the establishment of animal-houses. It has long been known, it is pointed out, that *Anopheles maculipennis* feeds freely on domestic animals, probably indeed preferring them to man, and figures are given of large catches of Anopheles in stables, which are, however, unchecked by numbers of corresponding catches from

dwellings. That this Anopheline habit can be used to protect man from bites, as now urged by ROUBAUD [under certain definite conditions only], was first insisted upon by BONSERFIZI in 1903 and again in 1905, in the Italian Province of Mantova. He, it is held, probed the matter to the bottom. He wrote then that the Province of Mantova contained much stagnant water and many Anopheles ; was a very fertile and progressive region, with a healthy population having a mortality of 20 per thousand ; had many Anopheles in its stables, few in its houses, the stables being heavily stocked with domestic animals ; but had certain heavily infected houses, these being unprovided with stables. BONSERVIZI looked upon domestic animals as exercising an important function in the prophylaxis of malaria by providing mosquitoes with food in place of man. [There seems then no question of the priority of BONSERVIZI's opinions on this matter, which fact, however, in view of the absence for so many years of any reference in Italian literature to this aspect of prophylaxis, does not appear to affect the importance and originality of ROUBAUD's present day advocacy of this prophylactic measure and of the details which he considers essential for success.]

C. L.

SERGENT (Edmond & Etienne), PARROT (L.) & DONATIEN (A.). **Le paludisme en Corse. Etude épidémiologique.**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 685–710. With 2 figs.

MARCHOUX (E.). **Le paludisme en Corse y est fonction de la misère.**—*Ibid.* pp. 654–658.

SERGENT (Edm. & Et.). **Les facteurs sociaux de la décroissance du paludisme.**—*Ibid.* pp. 658–662. With 2 text figs.

ROUBAUD (E.). **Le bien-être dans le paludisme et les maladies à trypanosomes.**—*Ibid.* pp. 662–665.

ABBATUCCI (S.). **Le paludisme dans ses rapports avec la situation économique de la Corse.**—*Ibid.* 1922. Jan. 11. Vol. 15. No. 1. pp. 92–98.

These papers all deal with malaria in Corsica. The first is the report of a Commission which investigated the matter in the autumn of 1921, when malaria was at its height, and which dealt mainly with the unhealthy eastern coastal plain. This alluvial plain, reaching a maximum height of 20 metres, is mainly uncultivated, often marshy, covered with scrub, intersected with century-old irrigation or drainage canals in a ruinous state, with soil deficient in lime and phosphates, and is intensely malarial, the splenic index being 39·9, as against 4·8 on the adjacent hills, and the plasmodial index 23·4, as against 1·6, while the percentage of *Anopheles maculipennis* with infected salivary glands is 1·2. The malarial species were present in the following proportions : *Plasmodium praecox* [*falciparum*] 86, *P. vivax* 36, *P. malariae* 14, mixed infections 2. [The fact that eosinophilia occurred in nearly one-third of the cases clearly demands future investigation and some caution in the drawing of conclusions, since all the facts are evidently not before us.] Anopheles breed universally, except in the brackish lagoons to which, however, popular opinion attributes the malaria, but particularly in the marshes which have formed behind the bars at the mouths of the rivers, and in the disused canals. It may be added that the figures in the Tables should be checked before being quoted.

Such being the facts, the other communications deal with their effects on the population and the means by which amelioration is likely to be obtained. Marchoux's view is this:—The country is administered by a prefect whose aim is to get out of it as soon as possible, and served by a monopolistic steamship company whose apparent object is to get out of it as much as possible, and whose heavy freights render prohibitive many essential imports, particularly coal and manures, without which the country cannot subsist. To supply the lack of coal the forests have been largely felled, while deforestation has been increased by fires. This denudation of the country has resulted in a lessened rainfall. When rain does fall it reaches the streams at once and is gone. The watercourses consist, between showers, of a series of pools in the hills, while the coastal marshes are ever present; both provide unrivalled anopheline breeding grounds. Malaria is so severe in the eastern coastal plain that it is mainly uninhabited, at least at night, and the soil itself has become so poor and so dry that what used to be named the golden fields are now practically uncultivated. Indeed, if the peasant put down seed corn, he regrets later that he did not instead eat it, since the crop is not worth cutting. Cattle have disappeared for want of fodder. Sheep and goats exist precariously at the expense of the diminishing forests. The inhabitants are so put to it for manure that one of the standard subjects of discussion is the relative value of the small quantity which their chickens and rabbits respectively produce. The economic situation is summed up in two phrases. Corsicans are accused of slackness in not putting their house in order; as well expect a man to uproot the Eiffel Tower with his bare hands. The country dies of thirst, its inhabitants of hunger. Sympathetic administration, reafforestation, state-aided importation of coal and manure are essential for recovery.

The brothers Sergent draw a useful parallel between the hinterland of Algiers in past years and the eastern coastal Corsican plain at present. In 1830 the barren plain of the Mitidja was practically uninhabited, the entire population of certain villages having been wiped out more than once. In 1841 the only parts of the colony functioning efficiently were the prosperous cemeteries. Then the plain began to be divested of the scrub which at that time covered it (as it now covers the eastern Corsican plain), until it has become a mosaic of intensive cultivation without a spare blade of grass on its fertile soil, and with malaria banished where cultivation is fully intensive. There are still as many larvae of *Anopheles maculipennis* to be found about Algiers as in the most malarious parts of Salonica, Algeria, Corsica, Vendée, and indeed, in the Bois de Boulogne in Paris; so this can hardly be the essential factor. Animal-houses are referred to as a possible partial explanation, but it is held that the good influence of intensive cultivation is less direct, being the result of prosperity, with its accompanying good food, clothing, housing and medication. The best formula for combating malaria on a large scale is held to be "Get rich." The lesson for Corsica is that little improvement can be expected until the well-being of the inhabitants is bettered, and this can only be effected by the improvement of the soil.

Roubaud, too, emphasizes the importance of general well-being in holding in check the symptoms of malaria, even if disinfestation be not thereby attained. He illustrates his point by reference to certain races of cattle in French West Africa, which, although in the tsetse zone and infected with trypanosomes, flourish so long as they are

not worked and have sufficient water. If these conditions fail, they die. He nevertheless held that his often expressed views can be applied to Corsica with benefit. If the best results are to be obtained, it is, he maintains, necessary to encourage to the full the natural preference of *A. maculipennis* for animals by supplying them with comfortable conditions for obtaining and digesting the blood of these creatures [this *Bulletin*, Vol. 18, p. 329]. He believes that under these conditions a generation of mosquitoes will arise which knows not Joseph, and if at the same time mosquitoes have been, by antilarval and other measures, so reduced that the supply of domestic animals suffices for their needs they will leave man alone; otherwise they emphatically will not. It will be remembered that Wesenberg-Lund [Vol. 18, p. 99] holds that it is by the unintentional application of just such conditions that Denmark has, in the course of years, been freed from malaria.

Abbatucci enforces the conclusions reached above. He adds the historical information that while the exiled Seneca had reason to bewail his miseries on insalubrious Corsica, the Eastern coastal plain of this island had, by the second century, reached, under the Roman administration, its golden age, the result of drainage, irrigation and cultivation. When Rome fell, and Genoese, Turks, pirates and English disputed for possession of the land, agriculture ceased and ill-health reasserted itself. We English, again, by the defeat of the great Napoleon, interrupted his schemes, poorly carried out by his lieutenants, for the betterment of his native country. Regarding the reforms referred to by Marchoux, freights have recently been halved and the French Government has promised to revise the agreement with the steamship company. The others still require to be pressed.

C. L.

Jaarverslag der Malaria-Commissie voor Noordholland over 1920. [Aldershoff (H.), Chairman. Korteweg (P. C.), Secretary.]—Reprinted from *Verslagen en Meded. Betreffende de Volksgezondheid*. 1921. No. 3. 23 pp.

Malaria has been so troublesome in North Holland as to justify the appointment towards the end of 1919 of a Commission to investigate and control it. Its work for 1920 is here reported. The incidence of malaria is estimated in two ways. The first rests on the diagnosis, apparently clinical, of medical men in practice. In Nieuwendam, for example, a practice covering about 3,000 persons gave 709 malarial cases, of which 485 were considered as primary, giving an incidence during the year of 16 per cent. Similarly, in Zaandam, a practice of 1,700 persons gave a morbidity of 152 cases regarded as new, or 9 per cent. The second method of estimation was by blood smears, taken, apparently, not promiscuously but from persons suspected. In Haarlem, Havelaar found 28 out of 116 infected; while at Amsterdam N. H. Swellengrebel and Korteweg found plasmodia in 287 out of 643 persons examined. With the exception of 5 quartan, all appear to have been benign tertian cases. There was no mortality.

The mosquito concerned was, one gathers, *Anopheles maculipennis* living domestically, although it has, in Holland, been found living "wild" as far as 3 km. from the nearest stable. *A. bifurcatus* is rare, and is not domesticated, so that, although a proved host of the malarial parasite, it is not implicated in this epidemic. The imagines

of *A. maculipennis* were found mainly in stables and, in descending order, in byres, kennels, rabbit-hutches, goat-stalls, and hen-houses, as many as 6,500 having been found in one day (February 21) in one stable. The methods of collection are twofold. In one a pan of water containing petroleum-soaked wadding is held under the rafter on which the mosquito sits, and she, overcome by the fumes, falls into the water. In the other a vacuum syringe is used, with draught so regulated as to be strong enough to suck in the mosquito as she rises from the cobwebs, but not strong enough to lift bits of straw. Mosquitoes so collected, particularly with the syringe, were suitable not merely for enumeration but for identification of species. Of 2,309 Anopheles collected from malarial houses, 0·7 per cent. were infected in the summer and 7·0 per cent. in November. It was always easier to find them in stables than in houses. Larvae were detected, mainly in canals and ditches, from May to October, but especially during August and September. The first male, indicating the new brood, was caught at the end of May. The Commission finds that, in the conditions prevailing in North Holland, sticklebacks prefer daphnae to anopheles larvae.

In prophylaxis, under prevailing conditions, larvicidal measures hold no practical hope of success. Gauze protection for houses is advocated and the destruction of imagines by petroleum or the vacuum syringe. The investigation continues.

C. L.

Eisendrath (B.). **Malariastations.**—*Nederl. Tijdschr. v. Geneesk.* 1921. Sept. 24. 65th Year. (2nd Half.) No. 13. pp. 1531–1540.

After referring to the malarial history of Northern Holland, and in particular to the coastal epidemic of 1826–27, which virtually decimated the provinces of Friesland and Groningen, the writer draws up a programme indicating the best means of combating the epidemic which attacked the province of North Holland [West of the Zuider Zee] last year. The usual measures are to be carried out through a series of malaria stations, each serving a population of about 50,000 souls. He was gratified to find, when he had to visit Emden as a reserve officer during the war, that they had there in force the [somewhat obvious] measures which he had himself advocated. Simultaneously, their malaria cases fell from 9 per cent. in 1918 to 0·9 per cent. in 1920. As he remarks in English :—"The proof of the pudding is the eating of it."

C. L.

Russ (Viktor) with others. **Studien ueber die Malaria in Niederösterreich.** [Malaria in Lower Austria.]—*Veröffentlichungen des Volksgesundheitsamtes im Bundesministerium für soziale Verwaltung.* XIV. 1921. 39 pp. [Wien. 1921.] With 1 map and 2 charts in text.

The Great War flooded Austria with men infected by malaria mainly in Italy, including Sardinia, and in Albania. At the same time, investigations showed that *Anopheles maculipennis* and *A. bifurcatus* are practically ubiquitous except in hilly portions of the country. Yet the number of undoubted autochthonous malarial cases reported from Lower Austria appears to be 6 only. Of 543 cases from the

Central Malarial Hospitals, of which details are given, exactly one-third were actually demonstrated to have mixed infections, 6 of them harbouring all three forms of parasite, while of 740 cases mentioned elsewhere 571 were benign tertian infections mostly occurring in the spring and winter, and 5 were quartan infections.

Glässner and Müllern found quinine, in doses of at least 30 gr. daily, satisfactory in fresh infections; Koch's method of administration good; those of Nocht and Teichmann unsatisfactory; intravenous and intramuscular injections excellent in comatose cases, but giving no permanent cure [*cf.* Acton, this *Bulletin*, Vol. 18, p. 335]; methylene blue in half-gramme doses good for quartan infections; neosalvarsan, methodically used, of temporary value, and very suitable for blackwater fever; and provocative methods of at least doubtful therapeutic value. There is much in these papers of marked local importance.

C. L.

Gioseffi (M.). **La malaria nell'Istria media durante il 1920. Osservazioni sulla bonifica umana e sulla anofelologia regionale.**—*Policlinico*. Sez. Prat. 1922. Jan. 23. Vol. 29. No. 4. pp. 113–119.

In a year whose rainfall to November 22 reached 647 mm., as against a normal annual fall of 1,088 mm., and in which the precipitation from July 1 to November 22 was only 163 mm., so that in the autumn all anopheline breeding-places were completely desiccated, improved malarial returns are attributed to better feeding of the inhabitants, increase of domestic animals, the larvicidal campaign of the preceding year, and only lastly to the drought of that under review. An anti-malarial campaign must, it is emphasized, be based upon registration of every inhabitant, individual by individual, and the ascertainment of his malarial state—actual, not apparent—using as aids such activators as adrenalin and strychnine. Every schoolmaster must, taught by an intensive course of instruction, be in a position to enlighten his scholars in the subject. It is not clear how far the ideal and the practical have been combined in this particular instance.

C. L.

The Transvaal Education Department. **Report on the Medical Inspection of Schools for the Year ended 31st December, 1920.** [Leipoldt (C. Louis), Cleaver (Anne F.) & Elias (P.), Medical Inspectors of Schools.]—60 pp. With 13 text figs., 1 plate and 1 folding map. 1921. Pretoria: The Government Printing and Stationery Office. [T.P. No. 4. '21. Price 1*s*.]

So important is malaria deemed to be in its adverse influence upon education in the Transvaal that half of this pamphlet is occupied by a special report on malarious schools. Appraisement of this report's value is not so easy as at first sight it appears to be. There is a clear and simple outline of the life-history of malarial parasites, although one must take exception to *Anopheles mauritianus* being designated as an "intermediate" host. Primary latency is described as common; 10 gr. of "quinine" weekly, in two 5-gr. doses, with an interval of two days between each dose, is advised as sufficient for a school-going child, but the treatment must be regular, prolonged and systematic. Wire gauze protection of hostels and teachers' houses

is evidently found more reliable than are mosquito nets, and satisfactory general instructions for the destruction by teachers of mosquito larvae are issued. It is perhaps unreasonable to expect, in a report of this nature, any reference to the type of malaria prevailing, or to the grounds on which the diagnosis of malaria is based, but it would be amazing that the whole booklet contains no reference to ankylostome infection were it not that reports of this infestation from the Transvaal are seemingly as rare as, till recently, they were from the Bombay Presidency. The description of the "chronic malarial child," his general symptoms, apart from the enlarged spleen and possibly the icteroid conjunctiva, his stunted growth, his mental incapacity, suggest ankylostomiasis, so that without complete blood and stool examination, it is unsafe to attribute them wholly to either parasite in countries where both parasites exist. The Transvaal lies within the world's hookworm belt, bordered by countries in which its prevalence is recognized—Natal, further from the equator, has recognized it for 17 years; free meals are provided at schools, so that there is clearly a poor-white problem as definite as exists in the United States; several of the illustrations show boys running barefoot under conditions which suggest that this is habitual with them. Further investigation, therefore, may discover that a good deal of the misery here attributed entirely to malaria may be due to ankylostome infestation; and irremediable until this is extirpated.

C. L.

Stephens (J. W. W.). **Malaria on a Venezuelan Oilfield.**—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 435–444. With 2 plates.

The proximity of European staff quarters to the dwellings of the native labourers, and of both to an anopheline swamp, violate first principles. An excellent site exists for the former on a ridge 300 feet high and a mile from human infection. In view of the expense of moving these quarters, it is recommended as a preliminary that one of the two native villages, one which is highly infected, should be eliminated, and the effect of partial drainage of the swamp, properly carried out under Professor Stephens' supervision, watched.

C. L.

Nedergaard (N.). **Malaria in Eastern Cuba.**—*Amer. Jl. Trop. Med.* 1921. Nov. Vol. 1. No. 6. pp. 381–388. With 3 charts in text.

During 12 consecutive months there were admitted to the hospital of a large Cuban sugar estate 5,453 persons. In 5,161 of them the blood was examined by the writer, or the results of the examinations of others checked by him. Of these, 2,458 gave a positive diagnosis of malaria, 296 being tertian, 25 quartan, and 2,154 subtertian cases. These are stated to represent minimal numbers, since many persons had had quinine before admission to hospital and "showed no parasites in the blood, although they were suffering from the immediate consequences of malaria." This conclusion can be accepted, since, with this heavy local infection, amounting to 47·6 per cent., only 0·3 per cent. were noted as showing a double infection. An attempt is made to correlate the very different racial incidence, with corresponding variations in housing and occupation. It was further found

that where a case did not clear up and enter upon the usual rapid convalescence, this frequently resulted from a concomitant hookworm infection. The economic importance of this heavy malarial morbidity is, the writer points out, imperfectly appreciated in Cuba.

C. L.

Hanson (Henry). **A Review of the Malaria Incidence on the Canal Zone. (Period of 1904 to 1918, inclusive.)**—*Proc. Med. Assoc. Isthm. Canal Zone.* 1919. Jan.–Dec. Vol. 12. Pts. 1 & 2. pp. 27–29.

Malaria increased in the Panama Canal Zone during 1918. In the regular sanitated areas cases fell to 182, the lowest recorded; but 290 cases occurred among a number of jungle-clearers in unsanitated areas. The good results in protected areas are due to unremitting care. Were this relaxed, sickness and death-rates would undoubtedly fall back from the present rates of 1·7 and 0·09 respectively towards those of 1906, namely 85 and 7·45.

C. L.

Walch (E.) & Walch-Sorgdrager (B.). [In Dutch and English.] **Een Malaria-Epidemie, veroorzaakt door** *M. sinensis.* **A Malarial Epidemic caused by** *M. sinensis.*—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1921. Pt. 1. pp. 2–47. With 1 chart and 1 map.

This report concerns a malarial epidemic occurring among the contract coolies of a coconut plantation near the coast of Sumatra. Before treatment was instituted the proportion of benign to malignant tertian infestations was as 34 to 76, while crescent carriers amounted to 83 per cent. of all infected, and among women to 90 per cent. The percentages of enlarged spleens were practically the same. Examinations of mosquitoes elicited a very interesting condition, the results being as follows:—

	Number dissected.	Number infected.	Percentage infected.
A. ludlowi ..	58	10	17·5
A. sinensis ..	7,257	107	1·5
A. kochi ..	79	9	11·5
A. aconitus ..	43	1	2
A. punctulatus	1	1	—

That is to say, although both *A. ludlowi* and *A. kochi* were far more favourable hosts for benign or malignant tertian parasites than was *A. sinensis*, yet its enormous local numerical preponderance made the last mosquito the one mainly concerned in the propagation of this particular epidemic. While it is acknowledged that *A. sinensis* is experimentally capable of infection, this is believed to be the first instance in which it has been reasonably implicated as the cause of an epidemic.

The writers do not completely subscribe to the belief that coarse pigment in the oocyst denotes the subtertian, and fine oblong pigment the tertian, parasite, for they are confronted with the question as to what inference is to be drawn from those cases in which the pigment is fine and round, and from those large cysts which contain both coarse and fine oblong pigment. Since the writers see no prospect of setting

the matter, except by direct inoculation experiments, it may perhaps be concluded that they do not necessarily attribute all the infections to human malaria.

As soon as there was started a course of bisulphate of quinine, in doses of 1·5 gm. [gr. xxii] daily for five days, and subsequently for some months on two consecutive days in each week, there was a diminution in sickness, in absenteeism, and in the more direct evidence of malaria afforded by blood and spleen. At the same time oocysts with fine oblong benign tertian pigment ceased to be found, and the proportion of benign to malignant tertian infections changed from that noted above, becoming as 47 to 53. The conjunction of these last conditions evidently puzzles the writers, but confirms the conclusions of Mayne [this *Bulletin*, Vol. 16, p. 310] and Wenyon [*vide supra*] that quinine is reasonably potent against the schizonts of subtertian and the gametocytes of tertian malaria, but not vice versa. The building of buffalo houses gave no satisfaction. The type used is not indicated.

C. L.

Schüffner (W.) & Hylkema (B.) [In Dutch and German.] **De Malaria-Epidemie te Naras (Priaman) in het Jaar 1918. Die Malaria-Epidemie in Naras im Jahre 1918.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1921. Pt. 1. pp. 48–91. With 3 folding charts and 4 illustrations.

Naras is a large village of 3,600 inhabitants on the West Coast of Sumatra. A serious epidemic therein was carried, at least predominantly, by *A. ludlowi*. All three species of parasite were implicated, the subtertian predominantly and the quartan slightly. Quinine acted most satisfactorily. At the time of examination the number of infected mosquitoes was 6 per cent.

C. L.

Belai (A.). **Beobachtungen bei einer Epidemie von Tertianafieber in russischer Kriegsgefangenschaft.** [Observations on an Epidemic of Tertian Fever among Prisoners of War in Russia.]—*Wien. Klin. Woch.* 1922. Jan. 19. Vol. 35. No. 3. pp. 57–58.

Of a party of 600 Austrian officers in a prisoners-of-war camp at Tozkoje, Samara, European Russia, half exhibited evidence of malarial infestation. As no Anopheles were found there after August, 1918, it is inferred that this is the last possible date of infection. Quinine was so scarce that it was reserved for special and complicated cases. At the end of September, 1918, all these officers were transferred 3,000 kilometres to an already established and occupied camp at Krassnojarsk, Jenisseisk, Siberia, a large proportion of those hitherto free from any evidence of infection going down with malaria during this nightmare journey of eleven days in cattle trucks. Arrived at Krassnojarsk, conditions were more normal. Food was abundant; quinine was sufficient; the interrelation between malaria and acute gonorrhoea was studied. While here almost all those transfers who had hitherto escaped malaria fell ill from it, the last case in August, 1919. It is accordingly concluded, the cases having evidently been without quinine, that the primary latency of this infection may reach one year. The writer is evidently convinced that Anopheles were absent from the second camp, for he is at a loss to explain the appearance of benign

tertian malaria in five of the original members of the hitherto malaria-free camp. Since these men slept next to, or close to, infected newcomers, he suggests the bed-bug as intermediary, but does not point out that, whatever be thought of this suggestion, the appearance of malaria among original members of the Siberian camp must necessarily weaken the validity of his evidence as to the long primary latency of the cases from the European camp. The diagnosis appears to have necessarily been clinical.

C. L.

Fairley (N. Hamilton) & Dew (H. R.). **The Clinical and Applied Pathology of Malarial Infections, with Observations on 1,135 Cases.** —*Australasian Med. Congress. Transactions of the Eleventh Session, held in Brisbane, Queensland, 21st–28th August, 1920.* pp. 637–646. (Discussion, pp. 645–646.)

Of 5,200 blood films examined during two years in the Near East, 1,077 were malarial, the parasite being malignant tertian in 389, benign tertian in 665, and quartan in 23. The pathological basis on which the severity of the first rests is believed to lie in its production of agglutination in infected erythrocytes. Out of 80 fatal cases death is considered as being uncomplicated in 13 only, the immediate cause being broncho-pneumonia in 47, bacillary dysentery in 15, and general sepsis in 5; but surely it might as fairly be stated that in a malarious country malaria may be a concomitant of every illness, while the tropical practitioner naturally allows for the possibility of at least two concurrent infestations. In cellular pathology, it not being stated whether the infection was or was not complicated by concomitant bacillary or helminthic infestations, there was found a remarkable erythroblastic response in the red marrow; myelocytes and myeloblasts were scanty; malarial parasites and pigment were usually undergoing phagocytosis. In cases complicated by broncho-pneumonia there was little leucocytosis, 12,000 being almost maximal; while in uncomplicated cases in Australians the average leucocytic percentage was: polymorphs 53, lymphocytes 25, large mononuclears and transitionals 21. Since 16 persons who had received three intramuscular injections of 12 gr. of quinine showed at autopsy no parasites anywhere, it is concluded that more than this dose is unnecessary, it being held that this quantity is "sufficient to temporarily cause a complete disappearance of the parasites." But, if complete, why temporary, provided there be no reinfection? The writers agree with those who hold that quinine is much more nearly specific for malignant than for benign tertian cases.

C. L.

Darling (Samuel T.). **The Tertian Characters of Quotidian Aestivo-Autumnal Fever.**—*Amer. Jl. Trop. Med.* 1921. Nov. Vol. 1. No. 6. pp. 397–408. With 1 chart.

After referring to two uncomplicated experimental infections with *Plasmodium falciparum* conveyed by mosquitoes reared from larvae, in which the initial paroxysms were tertian and the subsequent ones quotidian [see this *Bulletin*, Vol. 17, p. 144], and having emphasized the importance of noting in detail the form and timing of the different portions of the temperature chart, Darling proceeds to a critical examination of those with which Craig illustrated the paper in which

he upholds his division of "aestivo-autumnal" fever into two entities, a quotidian and a tertian, with corresponding parasites [*loc. cit.*, Vol. 18, p. 93]. On this analysis Darling maintains that all Craig's charts show a definite tertian periodicity, obscure in some, definite in others, and quotes his own original conclusion that "The creation of a specific plasmodium to account for clinical forms of aestivo autumnal fever having a quotidian periodicity is probably unwarranted."

C. L.

Loewy (Julius). **Ueber die Möglichkeit der Ueberwinterung infizierter Malariamücken.** [The Possibility of Malaria-infected Mosquitoes surviving the Winter.]—*Mediz. Klinik.* 1921. Apr. 17. Vol. 17. No. 16. p. 471.

Malarial morbidity in Belgrade reaches its maximum in September and disappears entirely in February. In this latter month two infants, lodged in a children's asylum there, situated close to swamps, developed benign tertian malaria. Relapse, the writer continues, can be absolutely excluded; no one in the asylum was ill of malaria; therefore the infection must have been conveyed by mosquitoes wintering in its warm rooms and infected the previous autumn; which reasoning and conclusion clearly imply the belief that latency, primary or secondary, is no feature of malaria; and many have rather emphatic convictions of an opposite kind.

C. L.

Cremonese (Guido). **Der Mechanismus des Malariafiebers.** Reprinted from *Ztschr. f. Hyg. u. Infektionskr.* 1921. Vol. 92. No. 3. pp. 475–484.

There are, it is stated, certain persons absolutely immune to malaria: there are others who are relatively immune; become infected, that is, but show no ill effects. These two phenomena are considered as analogous. In other words, the writer draws no distinction between the power to prevent entrance and survival of the parasite, and the adequate compensation of the ill-effects which it produces [Ross, this *Bulletin*, Vol. 18, p. 338]. There follows the statement that mosquito infection is greatest in the autumn, and that consequently human infection must in the main be then acquired, a conclusion which carries the corollary, the unity of species being postulated, that the spring outbreak is the first evidence (induced by climate on humoral antibodies) of a long-latent autumnal infection. In other words, primary latency is held to be the rule in malaria: and yet it will be recollected that it was apparently his disbelief in primary latency which actually converted Grassi to the unity theory [this *Bulletin*, Vol. 17, p. 293]. Natural immunity is held to depend upon the parasite acting as antigen, but only this acting so long as it is extracorpuscular. Once intracorpuscular, complement is held to be powerless to pair it off with antibody. The function of quinine is, Cremonese believes, quite clear; since it is, he says, well established that quinine enters the red blood corpuscles and there remains for 24 to 48 hours; and since by running quinine solution under a cover-glass malarial parasites have been seen breaking out of the erythrocytes, it follows that they have been driven out by the quinine only to fall victims to the antibodies lurking in the plasma.

Although Cremonese is such a strong advocate of the long latency of malaria, he cites as quite definite proof of the mutability of the two

forms Shoo's observation that 80 per cent. of the persons who in Java had subtertian fever, suffered in Holland from the benign tertian form. A double infection with latency of the benign tertian and cure of the malignant tertian species, ought in fairness to have at least been mentioned as a possibility. This double infection seems to be overlooked by Italian observers, but that it is common in Italy itself can hardly be doubted, seeing that Russ (*vide supra*) reports it in one-third of his predominantly Italian and Sardinian infections.

C. L.

i. Lucey (H. C.). **Observations bearing on the Reliability of the Large Mononuclear Count as an Aid to the Diagnosis of Malaria.**— *Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.). 1921. Oct. Vol. 14. No. 12. pp. 53–64. (Discussion pp. 64–70.)

ii. Broughton-Alcock (W.). **Laboratory Observations on Pensioners who contracted Malaria in the Late War.**— *Ibid.* pp. 45–53.

iii. Kop (W. A.). **The Change in the Leucocytic Blood-Picture as a Symptom of Malaria.**— *Jl. Trop. Med. & Hyg.* 1921. Nov. 1. Vol. 24. No. 21. pp. 278–283. With 15 charts in text.

i. The most interesting fact emerging from Lucey's paper is that in a perfectly normal person who had never had malaria, and whose venous blood showed a normal percentage of large mononuclear leucocytes, namely 7, the first drop of blood from the lobe, or border, of the ear gave a percentage of these leucocytes varying from 35 to 41. No percentage differing appreciably from the normal was ever obtained from finger blood; from the third drop of blood from the ear; from the blood of the lobe of the ear after this had been massaged or flicked, heated or cooled, or after exercise had been taken. It is concluded that in the ear, owing to its inactive circulation, the large mononuclear leucocytes tend to stagnate and cling to the capillary walls; but that when the circulation is rendered brisk they are swept off, the blood obtained from this part then forming a fair sample of that circulating generally. The kind of needle used for the puncture, the kind of prick employed, the technique of spreading, whether by pull or push, influenced the count not at all. It is clear that if the ear must be used as the source of blood for a film two drops must be wasted before the film is made.

ii. Broughton-Alcock finds that latent malarial cases invalided to this country cannot be expected to show an increase of large mononuclear leucocytes, large lymphocytes being excluded from this category. Significant of the parasitic tendencies of the pensioned old soldier is the fact that in one-third of the cases in which quinine was ordered the invalid had refrained from throwing on his system the strain of dealing with it, his urine betraying him.

iii. Kop, writing from the Central Military Laboratory, Weltevreden, Java, and dealing with more active malarias than did Lucey and Broughton-Alcock, concludes that, taking into consideration only the large mononuclear and transitional leucocytes, there is not often in malaria a mononucleosis of over 15 per cent., and that the high counts reported are due to inclusion of large lymphocytes. He finds, however, that a shift to the left of the Arneth count, a diminution, that is, in the number of nuclear lobes possessed by the polymorphs, is a constant and persistent symptom of malaria and indicates that there is likelihood of a relapse.

C. L.

Marchoux (E.). **Influence du bien-être sur la régression du paludisme.** [With Discussion.] *Bull. Soc. Path. Exot.* 1921. Oct. 12. Vol. 14. No. 8. pp. 455–459.

In 1821 a stringent law enforced the reclamation of the marshes about Charente and Vendée, and as a result the population lost the anaemia and fever from which they had been so generally suffering. The law gradually fell into desuetude, since fishing in the marshes brought in a living as profitable as and far less laborious than did agriculture in the reclaimed land; and the marshes are now as extensive as they were in 1821. Nor is there poetic justice in the matter, for though mosquitoes swarm and the influx of carriers has been great the people are not fever-stricken. This escape from the effects of sanitary iniquity is attributed partly to the multiplication of animal houses, which, as Roubaud has shown, shield [under certain definite conditions] human beings from anopheline attack; but in the main to increased well being in the population, since no one would dream of attributing the spontaneous disappearance of malaria which has occurred to the treatment which has been given. Brumpt challenges this conclusion, local inquiries having convinced him that the disappearance of the endemic foci of malaria in France is due to the use of that beneficent drug quinine.

C. L.

Benhamou, Jahier & Berthelemy. **Azotémie et paludisme; pathogénie de certains accès pernicieux.**—*Presse Méd.* 1921. Nov. 16. Vol. 29. No. 92. p. 912.

Cases are cited suggesting strongly the importance of estimating the quantity of urea in the blood of those suffering from pernicious attacks of malaria. In favourable malarial cases this is present to a percentage of between 0·27 and 0·52, this amount being slightly increased during the febrile attack. If the quantity exceed these limits prognosis becomes grave, and if it rise rapidly, or reach 2 per cent., death is probable, and energetic quininization and serum with glucose are indicated. On the other hand, coma with many parasites and a low urea content is, in the writers' experience, followed by cure, if quininization be sufficient.

C. L.

Bonain (C.). **Note au sujet de l'expression "paludisme de première invasion."**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 636–637.

Objection is taken to the looseness of the phrase occurring in the title and sanctioned by the International Commission of Hygiene. The writer recommends that terms used should specify from the point of view of infection, whether the attack is the first or second; from the point of view of the attack, whether its phase is primary or secondary; from the point of view of microbiology, whether the evolution of the parasite corresponds to primary or secondary malaria; and from the point of view of organic lesions, whether these are secondary or tertiary. One can, however, scarcely expect that there will come into general use terms indicating conditions which so many consider either impossible of determination or definitely incorrect, and no one has pointed this out so emphatically as Bonain's own countrymen.

C. L.

Neukirch (P.). **Zur Kenntnis der Malaria der Kriegsteilnehmer.** [Malaria among Troops.]—*Med. Klin.* Berlin. 1921. Aug. 28. Vol. 17. No. 35. p. 1060.

Being attacked on the ground that his opinion, based on the experience of 399 malarial cases in Turkey, that quinine does not sterilize malarial patients is incompatible with his belief that there would be no widespread malarial epidemic in Germany induced by the return of men infected on service, the author maintains that quinine does not cure but only suppresses malaria; time, climate, good-living and absence of reinfection being the real curative agents. C. L.

Schiassi (Francesco). **Sull'organizzazione del servizio di profilassi contro la malaria nell'esercito mobilitato durante la campagna di guerra 1915–1918.**—*Giorn. di Med. Milit.* 1922. Jan. 1. Vol. 70. No. 1. pp. 13–35.

This report indicates the large amount of antimalarial work, following the usual lines, undertaken for the 3rd Italian Army. Microscopic examination was undertaken in the pre-epidemic period with a view to detecting gametocyte carriers. They were paraded and treated with 3-gr. quinine tablets, eight being given daily for a week, four for the next fortnight, and two for the following two months. Malaria occurred in 19 per cent. of 9,000 men so treated. During the endemic period special hospitals and convalescent camps were instituted for malarial cases. Antilarval measures were adopted as far as possible, but metallic screening and petrolization were difficult on account of scarcity of material. Out of 2,497 positive blood examinations in which the species of parasite was noted, 1,201 were infestations with benign tertian, 15 with quartan, and 1,281 with malignant tertian malaria. In other words, no single case of double infection was noted. C. L.

Dionisi (Antonio). **La malaria delle terre redente.** [Malaria in the Territory regained by Italy.]—*Giorn. di Med. Milit.* 1921. June 1. Vol. 69. No. 6. pp. 221–236.

The condition of the malarious districts lying between the Julian Alps and the Adriatic has been worsened by the abandonment of agriculture and the flooded shell-holes consequent on fighting over this area. The same conditions have handicapped prophylaxis. The controlled ingestion of quinine was found very efficacious. Special treatment centres established close to the main body of troops, although their mechanical protection from mosquitoes was inadequate, did not seriously affect the diffusion of malaria in the district; at the same time their position facilitated speedy diagnosis and early treatment, and so must have saved many soldiers' lives. For the civil population a serious problem remains. The writer urges the establishment of a provincial bureau administered by a physician, a sanitary engineer, a zoologist, and an agricultural expert, to correlate the fight against malaria with agricultural reconstruction. J. Rosslyn Earp.

Jona (Giuseppe). **La tinta dei malarici.** [The Colour (of the Skin) in Malaria.]—*Policlinico.* Sez. Prat. 1921. July 18. Vol. 28. No. 29. pp. 971–976.

There is nothing specific about the colour of the skin in malaria; in the majority of cases it is due simply to a profound secondary anaemia. In order of frequency it is found to be earthy-yellow,

earthy-grey, waxy-white, according as yellow, brown or white is the fundamental colour of the individual's skin. Sometimes it is subicteric, the jaundice being most often of a form intermediate between haemolytic and retention. The malarial pigment is not fixed in the skin. While malarial melanoderma may be admitted as a possibility, it is certainly a very rare and exceptional condition.

J. Rosslyn Earp.

i. Sutherland (Halliday). **Glycosuria of Malarial Origin.**—*Brit. Med. Jl.* 1921. Nov. 5. pp. 746–747.
ii. Orlebar (Alexander). **Malarial Glycosuria.** [Correspondence.] —*Ibid.* 1922. Feb. 4. p. 209.
iii. Seidelin (Harald). **Glycosuria of Malarial Origin.** [Correspondence.]—*Ibid.* Feb. 18. p. 290.
iv. Castellani (Aldo) & Willmore (J. Graham). **Malarial Glycosuria.** [Correspondence.]—*Ibid.* Feb. 25. p. 330.

i. A man of 30, suffering from tuberculosis microscopically established, developed a temperature of 104·2°; and the onset of tubercular meningitis being accordingly suspected, the urine was examined and the suspicion strengthened by the finding of glycosuria. The temperature however fell, to rise again on the third day, this time without glycosuria, but, as blood examination now undertaken showed, with malarial parasites present.

ii. It is pointed out that the description of Castellani & Willmore's first case of malarial glycosuria [this *Bulletin*, Vol. 18, p. 333] is incomplete. While under Dr. Orlebar's care he had evidence of mild Graves' disease, namely tachicardia, slight exophthalmos, some thyroid enlargement, and tremors; and *temporary* glycosuria is fairly common in Graves' disease. He had plenty of quinine before passing under Dr. Castellani's care, and has had it since, but continues to have malarial attacks, without glycosuria. "It would appear possible that rest, quiet, and freedom from worry whilst in hospital improved his hyperthyroidic condition, and so caused a disappearance of the glycosuria. . . . The condition is so rare that it appears desirable to exclude all other possible diagnoses before making this one."

iii. Writing from the Belgian Congo, Seidelin suggests that "Glycosuria in a malarial subject" constitutes the best description for these cases. He points out how widely opinion has varied on this subject, and adds, "During a fairly long tropical experience in various parts of the world I remember no cases of glycosuria in which I had reason to suspect malaria as the cause."

iv. Castellani and Willmore adhere to their original diagnosis on the grounds that there was evidence from the Brighton clinic that quinine was not being excreted, and so not taken; that glycosuria persisted until he had received quinine intensively and under supervision; that malaria also disappeared according to report from Endsleigh Gardens and Brighton, and that glycosuria did not reappear after he left their care, although hyperthyroidism increased. C. L.

Brauer (L.) & Fraenkel (E.). **Das Malariaexanthem im klinischen und pathologisch-anatomischen Bilde.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 12. pp. 355–363. With 1 coloured plate and 7 figs.

A worker in a Warsaw village reached Hamburg via Danzig, and was admitted to hospital with fever and a petechial rash symmetrically

arranged on the outer side of the arms, on the gluteal region, and to a less extent on the forearms. He had rigors, and a blood examination disclosed benign tertian parasites. Two of the petechiae were excised, and displayed extravasation of blood with a cellular exudate, and thrombi becoming organized within the vessels. Naturally enough, the thrombi exhibited plasmodia. The condition was not due to quinine, since none had been taken; indeed, there was no history of previous malaria. The coagulability of the blood is not noted. The condition is attributed to the malarial virus, in opposition to Mühlens' quoted belief that it has never been shown that the "malarial exanthem" is really the result of malaria.

C. L.

Paisseau (G.), Schaeffer (H.) & Alcheck (E.). **Névrite paludéenne du nerf circonflexe.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1921. Nov. 24. Vol. 45. No. 33. pp. 1498-1504.

A Roumanian of 22 had an attack of benign tertian malaria, and complained of a persistent pain in the left shoulder, with awkwardness in movement. On awaking in the morning, thirteen days later, he found himself unable to raise his left arm, and wasting of the deltoid was apparent. After another febrile attack, three months later, there was slight implication of the supraspinatus and infraspinatus muscles, with slight diminution and retardation of sensibility in the posterior and outer aspects of the upper arm. The electrical reactions were as in neuritis. The Wassermann reaction being negative, and no other causation clear, it is concluded that this constitutes the thirty-seventh recorded case of peripheral neuritis from malaria. It is suggested that the lesion is essentially vascular.

C. L.

Home (W. E.). **Malaria and Urobilinuria.**—*Jl. Roy. Army Med. Corps.* 1921. Dec. Vol. 37. No. 6. pp. 463–464.

A trumpeter of 17, after seven years in India and a subsequent year at home with no history of malaria, developed fever with urobilinuria. A blood film showed a very sparse infection with *Plasmodium vivax* and quinine cured the condition. Rolland's test for bile pigment in the urine is recommended. It consists of iodine 1, potassium iodide 1, water 50, rectified spirit 150. This solution floats above the urine; it gives a sharp interface and a green line between, if bile pigment be present.

C. L.

Bersani (Iginio). **Crisi leucemoide in malarico.**—*Policlinico.* Sez. Prat. 1921. Aug. 8. Vol. 28. No. 32. pp. 1069–1071.

A patient with chronic malaria suffered from typical attacks, one of which eventually proved fatal. Blood examination showed the presence of the plasmodium and resultant changes in the red cells. The attention of the writer was attracted by the white cell count, which was as follows:—Haemocytoblasts, 16 per cent.; Rieder's cells, 5 per cent.; myeloblasts, 12 per cent.; lymphoblasts, 11 per cent.; neutrophil myelocytes, 5 per cent.; prolymphocytes, 1 per cent.; metamyelocytes, 11 per cent.; lymphocytes, 23 per cent.; polynuclear leucocytes, 16 per cent. The writer suggests that to account for this blood picture there must have been some secondary infection.

J. Rosslyn Earp.

ANDERSON (A. Greig). **Malaria in Macedonia, 1915-1919. Part II. Clinical Observations on the Treatment of Malaria in Macedonia.**— *Jl. Roy. Army Med. Corps.* 1922. Jan. Vol. 38. No. 1. pp. 25–40. With 2 charts in text.

The hospital at which the work here described was carried out was situated in an almost mosquito-free spot, the men being, in addition, protected by nets. Reinfection during treatment and observation, the latter generally covering 100 days, can accordingly be practically excluded. A case is classed as non-relapsing, provided it did not relapse during observation. For the purpose of the investigation a relapse is defined as a recurrence of fever accompanied by parasites in the blood. This limitation had to be made because the cases were so numerous that routine examination of all was impossible. The main essentials of the investigation are summarized in the accompanying condensation of the tables. All the cases were of benign tertian infection, except three of (7) and two of (8).

Treatment.	Admitted before July 1.		Admitted after July 1.		Total.	
	Number treated.	Percentage of non-relapses.	Number treated.	Percentage of non-relapses.	Number treated.	Percentage of non-relapses.
(1) Ross C. 17 ..	44	41	—	—	44	41
(2) Oral quinine and galyl ..	25	28	14	71·5	39	43·6
(3) Intramuscular quinine and galyl ..	21	28·6	37	64·9	58	51·8
(4) Ravaut's treatment ..	22	31·9	22	63·7	44	45·5
5) Oral quinine, 45 grs. daily	—	—	—	—	18	55·5*
(6) Oral quinine, 20 grs. daily	—	—	—	—	16	37·5*
(7) Double intensive intramuscular quinine ..	24	29·2	34	82·4	58	60·4
(8) Double intensive oral quinine ..	—	—	49	69·4	—	—
(9) Cacodylate of soda with (8)	—	—	25	68·0	—	—
(10) Week-end course of 60 grs. quinine	—	—	58	77·6	—	—
(11) Week-end course of 90 grs. quinine	—	—	21	61·9	—	—
(12) Controls ..	17	23·6	27	37·1	44	31·8

* Numbers too small to analyse in two series. Of total: 16 admitted previous to July 1, 18 after.

(1) For 12 days, bed and 60 grains of quinine daily, divided between 2 intramuscular injections of grains XV each and the rest by mouth. For 3 more days, 60 grains of quinine by mouth; confinement to bed and injections ceasing. For 14 more days, 20 grains of quinine daily, divided into 4 doses.

(2) As in (8), but with 6 weekly intravenous injections of galyl, the first of 20 cgms., the others of 40.

(3) As in (2), except that 2 of the 20-grain daily doses of quinine were given intramuscularly.

(4) Sodium cacodylate 0·2 gm. daily hypodermically for 4 days; 30 grains of quinine hydrochloride in 2 15-grain doses by mouth for the next 4 days; and so on alternately for 32 days.

(5) In 15-grain doses and given over 1 month.

(6) In 10-grain doses and given over 1 month.

(7) This apparently consisted of bed for 4 days, with 2 daily intramuscular injections, the quantity being unstated, of quinine bihydrochloride and of 20 grains of quinine hydrochloride by mouth daily. There was then seemingly an entire omission of treatment, the man being up for 10 days, after which the course was repeated.

(8) For 4 days bed with 60 grains of quinine hydrochloride daily in 3 equal doses. The course was repeated after an interval of 10 days.

(9) As in (8), with, in addition, 3 times a week for 5 weeks 3 grains of sodium cacodylate hypodermically.

(10) 10 grains 3 times daily on 2 consecutive days a week for 8 weeks.

(11) As in (10), but with 15-grain doses.

(12) Quinine given only during an acute attack.

Ross's treatment was poorly borne, and accompanied nearly always by nausea, vomiting, tinnitus, deafness; always by indurated buttocks. In all intramuscular treatments there occurred in a number of cases a rise of temperature to 100°, with a leucocytosis up to 27,000. Although all intramuscular injections are accepted as producing necrosis, in only one case in 960 did an abscess occur. Interrupted administration was much better tolerated than was continuous quinine administration. The influence of the period of the year on benign tertian relapse, so strikingly brought out in the Table, is a factor largely or wholly neglected in estimating the value of various kinds of treatment [see this *Bulletin*, Vol. 13, p. 85]. It is also emphasized that the results of treatment after July 1, as between the different methods, do not vary much. It seems indeed questionable whether, on the numbers here made available, reliable evaluation is possible, but clearly it can only be by the aggregation of such careful compilations, prepared under comparable conditions, that the matter can be finally settled.

C. L.

Normet. **Le traitement du paludisme.**— *Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Apr.–May–June. Vol. 19. No. 2. pp. 202–207.

This paper takes a deliberate ex-cathedrâ character, being intended as a guide to young colonial officers. The methods advised are clearly unsuited for mass treatment, and the experience described does not in all respects—as in the value of quinine in malignant tertian malaria—tally with that of others in other parts of the world. In a suspected malarial infection thick and thin smears are taken and sent to a laboratory. Quinine is then at once begun in injections, presumably intramuscular, and in doses of 1·5 gm. daily for three days in a man weighing 70 kilos. This route is preferred to the oral, because the drug cannot be rejected, and being absorbed more slowly is excreted more slowly. If the laboratory report benign tertian malaria, quinine

is administered over 18 days in diminishing doses of 1, 0·7 and 0·5 gm. Then follow five injections, each of 10 cgm. of hectine, on alternate days; next a week of powdered cinchona, or, still better, quinine. Another course of hectine, similar to the first, is next required, and thenceforward a preventive nightly dose of 0·25 gm. quinine so long as the individual remains within range of infection. If the laboratory report malignant tertian infection, quinine is looked upon as, by itself, incapable of effecting a cure. The dose of hectine must be doubled. If coma supervene, venesection to half a litre, with intravenous injection of quinine and novarsenobenzol, are reasonable procedures, but, in the writer's experience, useless. The two other complications noted are haemoglobinuria and neuritis.

C. L.

Hodson (V. S.). **The Cure of Malaria.**—*Jl. Trop. Med. & Hyg.* 1922. Jan. 16. Vol. 25. No. 2. pp. 18–20.

The writer believes it to be unwise to rely solely upon quinine and to disregard, as he puts it, "the very valuable help to hand in the *vis medicatrix naturae* element." He gives cogent instances in which malnutrition and fatigue have induced malarial manifestations. He claims to effect his purpose by giving quinine for three or four days each week, three days if 15 gr. daily be given intramuscularly, four days if 20 gr. daily be given orally. His idea is that as parasites develop in the quinine-free period, immune bodies are formed and tolerance to the drug is not induced. Concomitant helminthiasis is considered to be a considerable handicap to successful treatment. No controls were apparently used. Benign is held to be more resistant to quinine than is malignant tertian malaria.

C. L.

Rigollet. **Menace d'avortement dans le cours d'un accès pernicieux. Guérison par le traitement quinique.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 535–537. With 1 chart in text.

To give quinine during pregnancy is commonly held to be almost scandalously hazardous. Acton has urged, on experimental grounds [this *Bulletin*, Vol. 17, p. 306], that the risk of abortion from the effect of maternal high temperature on the foetus in malaria is greater, provided the os has not dilated, than is the risk from quinine. Moreover, this *Bulletin* has recently contained evidence that foetal malaria may occur; and, presumably, foetal death and maternal abortion may follow foetal malaria. It is, at all events, clear from the following report that M. Rigollet has strong grounds for urging that energetic quininization during threatening abortion may be not merely salutary but actually essential. A woman of 19, in the third month of pregnancy, had benign tertian malaria, with vomiting, diarrhoea, strong uterine contractions [evidently without discharge], coma, and a temperature which reached as high as 40·8° C. [105·4° F.]. Oral quinine being in the main rejected, the drug was administered intravenously and intramuscularly to the extent of 1·2 gm. on one day and 1·8 gm. on the next. The uterine contractions became very painful. An intravenous injection of 0·3 gm. on the third day was followed by crisis, with general amelioration and disappearance of the pains. Cure under oral quinine then progressed uneventfully, pregnancy being uninterrupted.

C. L.

Wood (E. Lomax). **A Note on the Treatment of Vomiting in Malaria.** —*Practitioner.* 1921. Dec. Vol. 107. No. 6. pp. 443–444.

Of eight cases of vomiting in acute malarial fever, six were treated with 7–8 minims of Liq. adrenalin hydrochlor. in water. In all of them a single dose stopped the vomiting. In two controls, in which this drug was withheld, vomiting continued for twenty-four hours.

C. L.

Bini (Guido). **La cinconina può sostituire la chinina.** [Cinchonine as a Substitute for Quinine.]—*Policlinico.* Sez. Prat. 1921. July 4. Vol. 28. No. 27. p. 919.

During the antimalaria campaign in the province of Udine, in the year 1919, the writer was compelled by the shortage of quinine salts to make use of some 50 lb. of cinchonine sulphate. A comparison of those districts in which cinchonine was used prophylactically with those in which quinine was similarly used convinces the writer that from this point of view the two alkaloids are of equal value. No harmful effects were found to result from the administration of cinchonine, not a single case of haemoglobinuria being referable to its use during the whole campaign. [Acton found cinchonine twice as effective as quinine in benign tertian malaria (this *Bulletin*, Vol. 16, p. 330). No harm seems ever to have followed its ingestion, although large quantities of it have been sold for years in India, it constituting 18 per cent. of cinchona febrifuge.—C.L.]

J. Rosslyn Earp.

Doerr (R.) & Kirschner (L.). **Zur Malariabehandlung der progressiven Paralyse.** [Malarial Treatment of General Paralysis.]—*Ztschr. f. Hyg. u. Infektionskr.* 1921. May 7. Vol. 92. No. 2. pp. 279–290.

This is not to be classed with those papers on malaria printed recently with undue frequency in this language, which leave the unfortunate impression that they have been written, not because the writer has something to write, but because he has to write something. The investigation here detailed is prompted by the observation that febrile attacks induce improvement in general paralysis of the insane, whether such attacks be due to infectious or contagious diseases, or to injections of such material as dead bacteria, their toxins, or egg albumin. It was determined to try the effect upon such cases of infection by benign tertian malaria. The procedure was as follows:—From a man, 18 years of age, with benign tertian malaria contracted in Lower Austria, venous blood was aspirated, and after defibrination 1 cc. was injected into a paralytic case. This man subsequently developed benign tertian malaria, and when he was deemed to have suffered from the infection sufficiently long for the purposes of the clinical investigation a sample of his blood was removed, defibrinated and injected into a second paralytic. This process was continued, the infection being handed on from man to man, and each case being treated so soon as it was clear that the next in the series had been infected. The effect on the original trouble appears undetermined, but as a study in malaria the work is of considerable interest. The infection was passed through 23 different persons for 240 parasitic generations, covering a period of sixteen months. During this period its morphological characters (those of *Plasmodium vivax*) never varied. This morphological stability will surely constitute a teasing difficulty

for consistent unity theorists. The infection was sometimes single, sometimes double. The period of incubation varied from 6–31 days. The infection was treated by 1 gm. of "quinine" daily for three days, and subsequently by 0·5 gm. daily for a fortnight. Weekly injections of salvarsan (0·3 gm.) or neosalvarsan (0·6 gm.) were also administered. During the period of observation, extending over 14–16 months, no relapse occurred, but in it three men died of intercurrent disease, and an autopsy on one of them, the twelfth passage, revealed no evidence of persisting malaria.

C. L.

VIALATTE (Ch.). **Sur des formes atypiques de** *Plasmodium praecox* **(*falciparum*).**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. pp. 236–239. With 1 plate.

The writer draws attention to forms of unusual shape:—Accoulée, pyriform, and even dendritic (see the coloured plates in ACTON's paper, mentioned in this *Bulletin*, Vol. 18, p. 335].

C. L.

HEINEMANN (H.). **Untersuchungen ueber den diagnostischen Wert der Methoden von Wassermann, Sachs-Georgi und Meinicke (D.M.) in Malarialändern. (Das Verhalten des Blutserums bei Malaria.)** [Investigation of the Diagnostic Value of the Wassermann, Sachs-Georgi and Meinicke Tests in Malarious Countries. (The Behaviour of the Blood Serum in Malaria.)]—*Muench. Med. Woch.* 1921. Dec. 2. Vol. 68. No. 48. pp. 1551–1553.

On comparing complement fixation reactions for syphilis, such as the Wassermann, with precipitin reactions, it is concluded that unspecific reactions are common in malaria but occur less frequently in the latter. The precipitin reactions are considered to be a valuable addition to complement fixation reactions, and to be permissible as a substitute for these, provided the local malarial error has been worked out. It is, however, best to use the two together.

C. L.

i. SOUTH AFRICAN MEDICAL RECORD. 1921. Nov. 26. Vol. 19. No. 22. pp. 441–442.—**Collective Investigation with Regard to Malaria.**

ii. LEONE (Raffaele). **Sul meccanismo patogenetico della perniciosa malarica.**—*Riforma Med.* 1921. Apr. 23. Vol. 37. No. 17. pp. 391–392. With 2 figs.

iii. GLASER (F.). **Malariatod durch Salvarsanschädigung.**—*Med. Klin.* Berlin. 1921. July 17. Vol. 17. No. 29. pp. 867–868.

i. With a view to focussing the experiences of those who have had an opportunity of studying malaria in South Africa and the adjoining regions, an exhaustive questionnaire, drawn up by Dr. Arthur PEARSON, has been addressed to the medical men concerned.

ii. Multiple infection of erythrocytes is described as conjugation.

iii. A man of 28 with syphilis, clinically and microscopically established, was treated with three mercurial injections, two of salvarsan and seven of sodium salvarsanate, the last of these on March 19. On March 21, fever with rigors, sweatings, and later, yellow discoloration of the skin set in. On March 31 malaria was recognized and two injections of quinine hydrochloride of rather less than 0·5 gm. each were given. He died on April 3. No parasites, but much pigment, were found after death, with universal icterus and much nephritis. Death is attributed to salvarsan lighting up old malaria.

C. L.

Barreto Mendez (Guillermo) **Tercer Congreso Venezolano de Medicina, Valencia, 23 a 29 de Junio de 1921. El impaludismo en el Estado Cojedes.**—*Gac. Méd. de Caracas.* 1921. Aug. 31 & Sept. 15. Vol. 28. Nos. 16 & 17. pp. 245–253 ; 259–267.

Bass (C. C.). **Specific Treatment of Malaria.**—*New Orleans Med. & Surg. Jl.* 1922. Jan. Vol. 74. No. 7. pp. 521–528.

Flamerich (C.). **Breves anotaciones sobre el paludismo en la ciudad de Valencia.**—*Gac. Méd. de Caracas.* 1921. Nov. 30. Vol. 28. No. 22. pp. 339–340.

Gianfranco (Capuani). **A proposito della tinta dei malarici.**—*Policlinico.* Sez. Prat. 1921. Sept. 5. Vol. 28. No. 36. pp. 1205–1206.

Marinesco (M. G.). **Report on a Case of Myoclonic Encephalomyelitis of Malarial Origin.**—*Proc. Roy. Soc. Med.* (Sect. of Neurology). 1921. Oct. Vol. 14. No. 12. pp. 51–55.

Mujica (J. C. Monso). **El paludismo en los territorios nacionales del Norte y provincia de Corrientes (Comisión profiláctica).**—*An. del Depart. Nac. Hig.* Buenos Aires. 1921. July & Aug. Vol. 27. No. 4. pp. 199–207.

Neveux. **Projet d'organisation en Serbie d'un service de prophylaxie de la malaria.**—*Rev. Méd. et Hyg. Trop.* 1921. Vol. 13. No. 3. pp. 72–78.

Ortega (Diego B.). **Paludismo.**—*Gac. Méd. de Caracas.* 1921. Nov. 30. Vol. 28. No. 22. pp. 345–349.

Sanguinetti (A.). **Cinconina e malaria.**—*Policlinico.* Sez. Prat. 1921. Dec. 5. Vol. 28. No. 49. pp. 1652–1653.

Wilson (S. A. Kinnier). **Case of Paralysis Agitans following Malaria.**—*Proc. Roy. Soc. Med.* (Sect. of Neurology). 1921. Oct. Vol. 14. No. 12. p. 48.

Erratum.

In Col. Clayton Lane's "Malaria : a Critical Review," Vol. 19, p. 96, latter part of the second paragraph, it is stated : "Mesnil and Roubaud have succeeded in infecting chimpanzees both with benign and with malignant tertian malaria." This should read : "in infecting a chimpanzee with benign tertian malaria." The page 32 in the same sentence should be 33. For "both infections," read "the infection."

KALA AZAR.

ADIE (Helen A.). **Preliminary Note on the Development of the Leishman Donovan Parasite in Spleen Juice and in the Alimentary Tract of *Cimex lectularius* (Lin.).**—*Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 255–260. With 4 coloured plates.

This paper describes the conclusions at which Mrs. Adie has arrived as a result of her observations on the behaviour of *L. donovani* in the spleen of man and in the bed bug. It is illustrated by four coloured plates, containing numerous figures which depict the various forms of the parasite which have been encountered.

It is claimed that in the spleen of man there are large intracellular parasites which divide by multiple fission to produce torpedo-shaped merozoites, and that these can be seen leaving heavily-infected broken-down cells in large numbers. These merozoites enter other cells, where they can be seen developing and dividing and setting free still smaller merozoites. It is assumed that it is these small merozoites which develop in the bug. Here they multiply by binary fission and later flagellate, after which they visit the wall of the intestine and eventually bore their way into the cells. They become encapsuled in the cytoplasm and grow in size, finally producing bodies which are compared to the intracellular spheres which occur in the cycle of development of *Trypanosoma lewisi* in the flea. From these numerous flagellates are produced which escape into the lumen of the gut. They may enter other cells or undergo syngamy.

After describing the development in the bug in detail, the author informs us, towards the end of the paper, that the figures are mostly taken from a striking success obtained in a bug that had died six days after feeding on heavily-infected spleen juice. The bug was found dead on the sixth day. It was placed in saline and kept at a temperature of 27° C. for 24 hours. It had probably been dead 36 hours (presumably before being placed in saline).

The paper is of a highly speculative nature and contains many assertions which are not borne out by the figures. There is no indication that the multiple fission referred to as taking place in the spleen occurs at all. The figures do not show this process. The description of the development in the bug is most unconvincing, and the statements that flagellates are seen boring their way into the cells by their posterior ends requires far more evidence to support it than the paper contains. In order to make such observations on living specimens one must suppose that the gut was previously broken up and its cells completely dislodged, in which case many of them would have been damaged and all normal relations lost. The process of syngamy, again, requires more evidence to support it than is given by the illustrations referred to. The figures illustrating the process are evidently from smears, and they may equally well represent dividing forms or merely forms in accidental contact. From the figures it is impossible to tell whether all the types depicted are leishmania or not. Many of them possess only a single nucleus and have the appearance of organisms of another nature. They may be developmental forms of some sporozoon or even yeasts, and that the bugs are liable to infection with other parasites is proved by the presence of nematode larvae, which the author notes. Quite apart from the involved description of the developmental process described in this paper, it must be evident that very little value can be attached to the behaviour of leishmania in dead bugs

in making deductions as to what will occur in the living insects. The intracellular stages of development may be merely a culture of leishmania in dead or dying cells. On the other hand, it is quite possible that many of the apparently intracellular forms seen in the smears are merely the result of overlying. It seems that the numerous fallacies connected with the smear method of examination of tissues have not been fully recognized.

C. M. Wenyon.

PATTON (W. S.). **Some Reflections on the Kala-Azar and Oriental Sore Problems.**—*Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. pp. 496–532. With 6 plates.

In this long and interesting paper the author gives verbal expression to certain thoughts and reflections which have been uppermost in his mind during the last few years. He has done this because he is unlikely to have any further opportunities of investigating the problems of the etiology of oriental sore and kala azar in India, subjects which have occupied his attention for the past 15 years.

As long ago as 1906 he came to the conclusion that the parasites of kala azar and oriental sore are primary flagellates of insects associated in one way or another with man, and for this reason he has studied some 20 species of insect flagellates and has worked out the life-histories of many of these.

He considers there is no ground for maintaining the genus *Leishmania*, for the work of LAVERAN and FRANCHINI has conclusively proved that more than one species of *Herpetomonas* parasitic in the insect can live and multiply in the organs of laboratory animals, in which they produce lesions exactly similar in every way to those of kala azar and oriental sore. It seems, however, that these experiments are not so conclusive as the author thinks, for the careful investigations conducted by HOARE [this *Bulletin*, Vol. 18, p. 185] do not lend support to this view, and raise doubts as to the accuracy of many of LAVERAN and FRANCHINI'S claims. Having decided that the name *Leishmania* must go, the author regrets that the name of LEISHMAN, the discoverer of the parasite, can no longer be associated with the parasite of kala azar. He accordingly suggests that kala azar should be known in future as "Leishman's disease," apparently overlooking the fact that there is no reason why the term leishmaniasis should no longer be employed. It seems to the reviewer that there is nothing to be gained by dropping the name *Leishmania*, which has been so long in use, especially as the complete life-cycle of the parasite is far from being completely understood.

As regards the flagellates of arthropods, the author points out that some of these appear to be parasitic only in the adults, while others are parasitic in the larvae as well. Infection is spread by the larvae or the adults ingesting rounded forms which have been passed in the faeces of the adults.

There are two possible methods of infection of man with the parasite of kala azar: by way of the alimentary tract or through the agency of blood-sucking insects.

The author has never been able to discover leishmania in the faecal mucus of cases of kala azar, nor has he been able to obtain any evidence that flagellate forms of leishmania will develop from such mucus. He has repeatedly failed to infect monkeys by feeding them with mucus, and is forced to the conclusion that the parasite of kala azar

if passed in the faeces cannot possibly survive and later be ingested by a healthy person. This being the case, he is strongly of the opinion that the parasite of kala azar is a true insect Herpetomonas, and that it finds its way into the tissues of man through the agency of its insect host. The blood-sucking insects associated with man in such a kala azar area as George Town, Madras, are mosquitoes, sand-flies, fleas, lice, ticks, bugs. The claims of these various arthropods as possible vectors of the disease are considered in detail. In the author's opinion the bed-bug alone has any serious claim to be thus regarded, and the numerous experiments which he has carried out with this hemipteron are reviewed, as well as the unsuccessful ones made with other possible vectors. The bed-bug alone has given encouragement, for, as is well known, the leishmania ingested will develop into flagellates and the infection may persist as long as 41 days. It is stated that only a small percentage of bugs on becoming infected can remain so, and that this affords an explanation of the fact that kala azar is not more prevalent, although the bug abounds everywhere. As explained more fully in an earlier paper, this lack of correspondence is due to the small chance of an infected bug being transported to another locality. It seems to the reviewer that this argument ignores the possibility of spread of disease by the movement of infected human beings to other localities in which bed-bugs abound.

The methods by which the bug can carry infection to man are next discussed, and it is concluded that infection is spread by bugs being crushed on the skin. The production of CORNWALL's "thick-tail" forms in the stomach of the bugs is regarded as of importance as supplying the missing link in the cycle of development, which, in the author's opinion, has been completed by Mrs. ADIE's discovery of the intracellular development in the bug. He concludes that the discovery of the "thick-tail" form and Mrs. ADIE's observations supply the final proof that Cimex is the true invertebrate host of *Herpetomonas donovani*.

Under the heading "The Oriental Sore Problem," this disease is considered. According to the author, the parasite *Leishmania tropica* should be known as *Herpetomonas furunculosa* [*? furunculosa*], as it was first described by FIRTH in 1891. As regards the possibility of oriental sore protecting against kala azar, he states that he has known a case which contracted kala azar in Assam after suffering from oriental sore on the Indian frontier. The various possible vectors of oriental sore are considered in detail, and it is concluded that in Mesopotamia the disease is spread by Phlebotomus, and in Cambay in India by the bed-bug. In certain areas in Mesopotamia where oriental sore is common, bed-bugs do not occur. In Cambay, on the other hand, they abound. The reason for regarding the bed-bug as the vector in Cambay, and not Phlebotomus, which also occurs there, is that the parasite behaves in bugs like the parasite of kala azar. The author has been able, by means of a special technique, which is not described, to confirm Mrs. ADIE's discovery of an intracellular stage for the parasites of both oriental sore and kala azar. In spite of this it seems to the reviewer very improbable that if oriental sore is carried in Mesopotamia by the sand-fly it should have the bug as a vector in Cambay. It has to be remembered that the parasite of the Mesopotamian disease will also develop in the bed-bug.

It is impossible in a review of this length to consider all the arguments which the author adduces in support of his theories. Those who desire to form an accurate opinion of the views expressed must

read the original article. One point, however, may be noted in conclusion. Having decided that the parasite of kala azar should be known as *Herpetomonas donovani*, and that of oriental sore as *Herpetomonas farunculosa*, it seems inconsistent that the names *Leishmania donovani*, *Leishmania tropica* and *Herpetomonas tropica* should be constantly cropping up in the paper. It appears as if the author himself finds it difficult to dispense with the habit of using the well-known terminology.

C. M. W.

Patton (W. S.), La Frenais (H. M.) & Sundara Rao. **Studies on the Flagellates of the Genera** *Herpetomonas*, *Crithidia* **and** *Rhynchoidomonas*. **No. 8. Note on the Behaviour of** *Herpetomonas tropica*, **Wright, the Parasite of Cutaneous Herpetomonas** [sic] **(Oriental Sore) in the Bed Bug,** *Cimex hemiptera*, **Fabr. No. 9. Note on the Behaviour of** *Herpetomonas donovani*, **Laveran and Mesnil, in the Bed Bug,** *Cimex hemiptera*, **Fabricius.**—*Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 240–251. With 1 text fig. and 2 plates; & pp. 252–254.

In previous publications one of the authors (Patton) had shown that if a bug which had ingested leishmania from the peripheral blood of a case of kala azar was allowed to have another feed of blood the parasites which were still present in the bug disappeared in the majority of cases. Sometimes, however, a few of the organisms persisted. These are very difficult to find by direct examination. Accordingly the authors decided to test the persistence of the parasites in the bug by making cultures on N.N.N. medium.

The midgut of a bug which had ingested cultures of *Leishmania donovani* (the authors call it *Herpetomonas donovani*) and had no subsequent feed of blood was still infected on the thirty-first day, while the midgut and rectum of another similarly treated bug gave a positive culture on the thirty-fourth day.

As regards bugs which were fed on human blood after they had taken up cultures of *L. donovani*, the midgut of one gave a culture on the forty-first day and the hindgut of another on the thirty fourth day. A bug fed as a nymph on a culture gave a positive result 34 days later in cultures from its midgut.

It is evident *L. donovani* can live in the midgut of a bug for a long time, even in spite of successive feeds of blood. The authors point out that they have made cultures from the alimentary tracts of 1,233 bugs, with the result that they have demonstrated that the normal tract of the bug is bacteriologically sterile.

C. M. W.

Cornwall (J. W.) & La Frenais (H. M.). **A Contribution to the Study of Kala-Azar (V.).**—*Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. pp. 533–544. With 5 text figs.

With a view to obtaining corroboration of Mrs. Adie's claim that *L. donovani* undergoes an intracellular development in the cells of the stomach of the bug, the authors have carried out a series of investigations on the behaviour of the organism in these insects. Bugs were fed on cultures of the parasite, and the alimentary tracts were examined at varying intervals. Not only was fresh material studied, but the entire stomach was fixed and examined in serial sections, with the object of obtaining information as to the relations

of the parasite to the undisturbed cells. The freshly removed, unruptured stomach can be examined with high powers if it is slightly flattened under the cover slip. Though the flagellates could be seen moving in the contents, in no instance could parasites be seen within the cells. For the study of further detail the stomach was ruptured. In some cases flagellates or round bodies were seen apparently within cells, but there was no certainty that these had not accidentally entered damaged cells. It is noted that the multiplying nuclei of regenerating cells might readily be mistaken for bunches of parasites. The examination of smears stained by Romanowsky's method brought nothing to light as regards an intracellular phase.

In the stomach of some bugs the flagellates do not multiply freely, but die out in a few days. In others they persist, while in a small proportion the multiplication is incredibly great, so that the stomach and upper part of the gut become mere bags filled with a seething mass of organisms.

Examination of serial sections of the fixed stomach did not reveal anything in the way of an intracellular phase of development. It is pointed out that the cells of the stomach during active secretion are practically broken at the surface and are thus open to the invader. It is therefore possible for flagellates to penetrate these by accident, and though occasionally within such cells structures having the appearance of leishmania were seen, it was not possible to obtain conclusive evidence that they were not artefacts.

The thick-tailed form of the parasite originally described by one of the authors (Cornwall) from the stomach of bugs is discussed. It is concluded that it does not form an essential link in the cycle of development.

C. M. W.

Adie (H. A.). [**Telegram announcing Finding Leishman-Donovan Bodies in Salivary Glands and Ducts of** *Cimex rotundatus*.] — *Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. p. v.

The following are the words of the telegram, reference to which is made in the letter "Kala-Azar and the Bed Bug," reproduced below :—

"Director on tour, so I inform you direct of swarming infection of Leishman-Donovan bodies found in salivary glands and ducts of *C. rotundatus* caught 24th instant on bed of suspected Kala-azar case in infected area. Dissected 26th instant. The discovery positively proves that the bed bug is capable of transmitting the disease through biting."

C. M. W.

Wenyon (C. M.). **Kala-Azar and the Bed Bug.** [Correspondence.] — *Lancet.* 1922. Feb. 25. pp. 400–401.

"The announcement in the *Indian Journal of Medical Research* for January, 1922, of a telegram, received from Mrs. Adie, stating that she has found a swarming infection of Leishman-Donovan bodies in the salivary glands and ducts of *Cimex rotundatus* caught in the bed of a suspected kala-azar case, and that this discovery positively proves that the bed bug is capable of transmitting the disease through biting, raises once again the whole question of the transmission of this disease. In the light of the announcement it may be well to review the various investigations which led to the bed bug being accused of transmitting kala-azar, and to weigh the evidence which has been adduced in favour of this

hypothesis, for, however probable it may be, it must always remain a hypothesis till the actual transmission experiments have been carried out. The announcement, to which you drew attention in an annotation in THE LANCET of February 11th, may lead to the hasty conclusion that the method of transmission of the disease by the bed bug has at last been solved.

"When kala-azar first became known as a distinct disease in India after the investigations of Leishman, Donovan, Rogers, and others, attention was turned to the discovery of a vector. It was realised that kala-azar was a house disease and Rogers and many others considered the bed bug as a possible agent. This elusive insect is admirably suited to play a part in the spread of infections. It does not live on its host but sucks his blood at night, returning in the daytime to any shelter it may find. It ingests a large quantity of blood on which it may survive for long periods without further feeding. Every time it feeds, it may do so on a different individual, while it is easily transported from place to place in bedding or furniture. In spite of these facts, though the bug has been accused of carrying many diseases, it has never been proved to carry any one of them.

"That the bug was suspected as being the carrier of kala-azar was only natural, but against this view is the very strong argument that the disease in India is peculiarly limited in distribution, while the bed bug occurs everywhere. In order to obtain more definite evidence, Patton turned his attention to the behaviour of the Leishman-Donovan body in the bug. He demonstrated the presence of Leishman-Donovan bodies in the peripheral blood of cases of kala-azar and proved that bed bugs fed on these cases ingested parasites with the blood they imbibed. Your notice in last week's LANCET suggests that the scantiness of parasites in the peripheral blood argues against any invertebrate vector acquiring infections from this source. It has been demonstrated that cultures, which ultimately contain thousands of flagellates, can be obtained from a few drops of finger blood, and we have no reason to suppose that the invertebrate vector, whatever it may be, may not obtain from the blood a sufficient number of parasites to lead to its infection. Patton was able to prove that the organism ingested from the peripheral blood of cases of kala-azar developed in o a fully formed flagellate in the stomach of the bug, as Rogers had shown it did in the culture tube. This fact was regarded as proof that the bug was the carrier of kala-azar. It was, however, discovered by the writer that other flagellates, such as the rat trypanosome, were also able to undergo a development in the bug, and furthermore, that the parasite of oriental sore of Bagdad, a disease which is certainly not carried by the bug, also developed into flagellate stages in this insect. It was concluded, with ample justification as subsequent investigations prove, that the stomach of the bug could act merely as a culture tube on account of the large quantity of slowly digesting blood it contained and that the mere fact that the Leishman-Donovan body became a flagellate in the stomach of the bug was in itself no proof that this insect was its natural host. This conclusion has received support from experiments conducted subsequently by Patton himself. He has investigated the length of time the flagellates can persist in the bug and has proved that those developed from the Leishman-Donovan body may still be present 41 days after the parasites were first taken up. He has, however, shown that other flagellates, of which the bed bug cannot possibly be a host, such as those of the flea and house-fly, can survive in the bug for even a longer period. The mere persistence of the Leishman-Donovan body in the bug has thus taken us no further towards arriving at a final verdict.

"The next step was the announcement by Mrs. Adie last year that the Leishman-Donovan body, after being taken up by the bug, actually entered the cells of the stomach and there underwent a development comparable with that which is known to take place in the case of the rat trypanosome during its development in the flea. It is unfortunate

that this process was only observed in dead bugs in which the cells of the stomach must evidently be in an unnatural condition and subject to invasion by organisms in a manner which would not occur in life. Patton states that he has confirmed these observations, but here again it is not clear that the intracellular stages were observed in living bugs. Nevertheless, he claims that 'this is the final proof that Cimex is the true invertebrate host of *Herpetomonas donovani*.' It is maintained that the flagellate enters the cell of the stomach and there becomes the 'thick-tailed' form, which was first described by Cornwall, and that this proceeds to multiply within the cell. No details of Patton's technique are known, but . . . [from Mrs. Adie's illustrations] it is far from clear . . . that all the forms . . . are really Leishman-Donovan bodies, or developmental stages of these. Some of them have the appearance of parasites of a different nature entirely—possibly sporozoa—and that other parasites may be present is proved by the fact that nematode larvæ occurred in these bugs. It is useless to speculate as to how the latter gained entrance to the bugs, but it is clear that observations made on bugs which have been dead some days and which have other concurrent infections cannot be employed or must be employed with the utmost caution in making deductions as to what happens to the Leishman-Donovan body under natural conditions. From Mrs. Adie's results and his own confirmations of these, together with the fact that he has never found the least evidence of a salivary gland infection during the many years he has investigated the subject, Patton comes to the conclusion that the parasite is transferred to man by the bug being crushed on the skin and not by the bite of the bug.

"It is difficult to judge of the significance of the intracellular stages in the bug, but one must be cautious in concluding that what occurs in dead cells is an indication of what will occur in life. Neither Mrs. Adie nor Patton has obtained evidence of the intracellular stage in living bugs, and it seems not improbable that just as the flagellates of the flea and house-fly were shown to persist in the bug as long as, or even longer than, the parasite of kala-azar, so intracellular stages would occur in the case of dead or dying cells. The observations of Mrs. Adie and Patton were made on crushed material examined fresh and in smears, a method which gives very erroneous ideas of the true relation of parasites to cells. It is highly significant that in the same number of the *Indian Journal of Medical Research*, Cornwall describes experiments he has made with bugs with the object of confirming Mrs. Adie's observations. Cornwall employed live bugs fed on cultures and the stomachs were fixed entire and sectioned without disturbing the cells. Though heavy infections of the stomach occurred, he could not obtain the slightest evidence of any intracellular stage. Furthermore, he concludes that the 'thick-tailed' form first described by him and upon which Mrs. Adie and Patton lay so much stress, is merely an abnormal form and has no place in the true life-cycle of the parasite. It is clear, therefore, that there is no real evidence that an intracellular stage occurs during the development of the Leishman-Donovan body in the living bed bug and that the stages which have been found in the dead bugs may be merely a culture of the flagellate in dead or dying cells, and, as already remarked, it is not improbable that other flagellates may behave in a similar manner under like conditions. Patton's statement, therefore, that 'the final proof' has been obtained seems premature.

"We now come to the last stage—namely, the announcement contained in Mrs. Adie's telegram that Leishman-Donovan bodies have been found in the salivary glands of the bug. If this is correct,* then Patton's carefully

* Since writing this letter the reviewer has received reliable information from India that the bodies seen by Mrs. Adie in the salivary glands were not Leishman Donovan bodies. They are possibly yeasts or the microsporidian Nosema, the infection with which was not limited to the salivary glands but occurred in all the tissues of the body.

argued conclusion expressed in the same number of the *Journal* that infection is spread by the crushing of the bug on the skin will hardly be necessary. On Mrs. Adie's observation itself it is difficult to form an opinion from the few details which the telegram contains. In the first place, it is evident that the bug came from the bed, not of a case of kala-azar but only a suspected case, and there is no proof that the bug had even fed on this particular individual. Furthermore, it is quite clear that the statement that the parasites in the salivary glands were actually Leishman-Donovan bodies requires proof. It is notoriously difficult to identify flagellates of this kind. Those which produce kala-azar and oriental sore are often indistinguishable from purely insect flagellates which give rise to no disease and are never parasitic in vertebrates. However closely the salivary-gland forms seen by Mrs. Adie resembled the parasites of kala-azar, it is impossible that she can have obtained proof, from the single observation, that she was actually dealing with what she supposes the organism to be. It is quite possible that the bed bug may occasionally harbour a flagellate of its own, though, if this be so, Mrs. Adie is the first to discover such an infection. Flagellates resembling the Leishman-Donovan body occur in many arthropods. They are mostly parasites of the intestine but occasionally invade the body cavity, salivary glands, and other organs, while in one case a development in the cells of the stomach has been described. It is possible that Mrs. Adie was dealing with a rare infection of this kind.* As an illustration of the confusion to which such an organism may give rise, we have only to remember the natural flagellate of the tsetse-fly which was frequently mistaken for developmental stages of pathogenic trypanosomes in Africa. The fact that the flea harbours a flagellate very similar to that of kala-azar has often led to the latter being regarded as the kala-azar parasite itself and to the view that Mediterranean kala-azar is transmitted by the flea.

"The fact that thousands of bugs have been dissected during kala-azar investigations without a single instance of a natural flagellate of the bug being discovered may suggest that Mrs. Adie was actually observing the parasite of kala-azar. On the other hand, thousands of bugs which have taken up the parasite of kala-azar, or have had opportunity of doing so, have also been examined without evidence of salivary-gland infection by the parasite being found. . . . Whether Mrs. Adie was dealing with a harmless flagellate of the bug or a developmental stage of the Leishman-Donovan body it is evident that a salivary-gland infection is of very rare occurrence. The observation is undoubtedly a valuable one and may be very suggestive in view of the fact that the bug, as far as we know, rarely feeds on anything except human blood, but unfortunately the final proof of the nature of the flagellate is lacking and cannot be obtained till many more similar instances have been seen. If it could be demonstrated that laboratory-bred bugs which ingest Leishman-Donovan bodies from the peripheral blood of cases of kala-azar show developmental stages in the stomach and within the cells of this organ, and that this is followed by an infection of the salivary gland, then there would be great presumptive evidence in favour of regarding the bug as the vector, though the final proof could only be obtained by the actual transmission of the disease. Up to the present this has not been done.

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* At the Indian Science Congress held at Madras, February 1922, there was a discussion in the Medical Research Section on Kala Azar, in which many members took part. The following is extracted from the *Lancet*, Mar. 25, 1922, p. 603:—

"Colonel E. D. W. Greig read a communication from Mrs. Adie on the new bodies which she had discovered in the salivary glands of the bed-bug. . . . . The general impression . . . . was that the bodies demonstrated . . . . could not be accepted without further study, and Colonel W. Glen Liston pointed out that the bodies were similar to those found by the Plague Research Commission in the salivary glands of the flea. The discussion was summed up by Colonel Greig, who pointed out that the problem of kala-azar was far from being solved."

That opinion in India is still undecided is borne out by the fact that in this one number of the *Indian Journal of Medical Research* we find that, as a result of the discovery of the so-called intracellular stages, Patton considers that the final proof that Cimex is the invertebrate host has been obtained, and that infection occurs through the crushing of the bug on the skin, Mrs. Adie wires that her discovery positively proves that the bed bug is capable of transmitting the disease through biting, while Cornwall suggests that it would be well to give the bed bug a rest in connexion with leishmaniasis and that some other possible vector be carefully investigated. From an epidemiological point of view, there is something to be said in favour of the bed bug hypothesis, but the wide distribution of the bug compared with that of kala-azar is against it. Patton believes that the fact that only a small percentage of bugs are able to become infected and remain so explains why the distribution of the bug does not correspond with that of kala-azar—presumably because there is only a remote chance of infected bugs being transferred from place to place. This argument seems to ignore the fact that disease is rarely spread by the transportation of infected insects, but by the movements of already infected human beings. Cases of kala-azar have constantly moved from the endemic centres in India to other places where it does not exist, and though in these bed bugs abound, the disease has never become established. This is one of the most puzzling features of kala-azar, and if the ubiquitous bug should prove to be the vector, it will be very difficult to explain why the disease is limited to special endemic foci.

"We may conclude, therefore, that the bed bug, though a suspected agent, still awaits the final verdict, and that unless more tangible and convincing evidence is forthcoming the jury will certainly disagree. Every credit is due to the prosecution for their most careful and exhaustive inquiries which have extended over many years, and which have been stimulated by a desire to rid the world of a harmful parasite, but the elusive bug, which has been acquitted of so many charges, has so far escaped sentence in the case of kala-azar also."

FRANCO (Enrico E.). **Etudes sur les leishmanioses. Travaux de l'Institut de Pathologie Générale et d'Anatomie Pathologique de l'Université de Lisbonne.**—Reprinted from *Jl. Sciências Matemáticas, Fisicas e Naturais.* 1921. 3rd Ser. No. 8. 8 pp. With 1 map.

That infantile kala azar occurred in Portugal was first noted by ALVARES, who recorded a case from Lisbon in 1910. The author of the paper under review has collected data of 33 cases which have been seen in the country. Details of these are given in a table and their distribution is shown on a map. The ages varied from nine months to nine years, but only two of the cases were over six years of age. All the cases occurred in Lisbon itself or in its immediate vicinity.

Though oriental sore occurs in Spain, as first noted by CAMACHO (1914), no indigenous case has been seen in Portugal.

C. M. W.

MILIO (Giulio). **Sulla diffusione della leishmaniosi interna a Messina e dintorni.** [Distribution of Infantile Kala Azar in Messina and Neighbourhood.]—*Pediatria.* 1921. Dec. 15. Vol. 29. No. 24. pp. 1109–1119.

During the year 1920–21, 900 children were seen at the clinic at Messina. Amongst these there were 32 cases of kala azar, giving a percentage of 3·5. The cases came not merely from the towns, but

also from the smaller villages, and their distribution was so general that it was impossible to obtain evidence of any special centres of infection. The paper gives short histories of the cases.

In 12 cases it was possible to carry out treatment by intramuscular injections of stibacetin. Of these three died, five were cured, and four were progressing favourably. The number of injections required to effect a cure varied from 20 to 31.

C. M. W.

Nicolle (Ch.). **Addendum au mémoire : Chronique du Kala-Azar en Tunisie. Tome 1, fascicule 1, page 33.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. p. 345.

This note corrects an omission which was made in the author's account of kala azar in Tunis. It was there stated that the first Tunisian case was made known by Cathoire. As a matter of fact the discovery was made by Laveran, who found Leishmania in a spleen smear which had been sent to him by Cathoire (this *Bulletin*, Vol. 18, p. 238).

C. M. W.

Fox (E. C. R.) & Mackie (F. P.). **The Formol-Gel Test in Kala Azar.** —*Indian Med. Gaz.* 1921. Oct. Vol. 56. No. 10. pp. 374–375.

The authors have devised a simple method of carrying out the "formol-gel" test in kala azar. The blood from the finger is collected in a Wright's capsule, as for a Widal test. When the serum has separated a drop is placed on a slide and inverted over a watch glass containing a few drops of commercial formalin. In cases of kala azar the serum will solidify in a few minutes, while other sera will remain unaffected. The solidified serum is opaque and in the form of a stiff jelly which adheres to the slide, whilst in negative cases it will run off the slide when tilted.

A positive result was obtained in 20 cases of known kala azar. In 19 cases of syphilis a positive result was seen in two cases, but no details of the histories of these were known. Of four cases of malaria, one gave a positive result, but this was a case actually undergoing examination because of suspected kala azar. Six other controls were quite negative.

As the authors remark, the value and limitations of this test have yet to be determined.

C. M. W.

Sia (Richard H. P.). **Ray's "Hemolytic" Test in Kala-azar.**—*China Med. Jl.* 1921. Sept. Vol. 35. No. 5. pp. 397–399.

—— & Hsien Wu. **Serum Globulin in Kala-azar.**—*China Méd. Jl.* 1921. Nov. Vol. 35. No. 6. pp. 527–532.

The author applied Ray's test to 86 patients suffering from various diseases, including 16 cases of kala azar. The test is carried out by adding 20 cmm. of blood to 6 cc. distilled water in test-tubes 7–8 mm. in diameter. The mixture is thoroughly shaken, and a reading is made at the end of five to ten minutes. It was found that in all the kala azar cases, and in no others, the mixture remained turbid and formed a flocculent precipitate on standing. Amongst the negative cases there were 10 of anaemia with haemoglobin ranging from 30 to 60 per cent.

In the second paper are described experiments made with the object of testing RAY's contention that the precipitate is due to incomplete haemolysis of the red cells. It was found that, using saponin as a haemolytic agent, kala azar serum did not protect red cells against haemolysis any more than normal serum. It was found, however, that kala azar serum alone produced a precipitate when mixed with distilled water, and chemical analysis of the precipitate showed it to be serum globulin. The globulin content of kala azar blood was found to be higher than in any other disease, and it is proposed to call the test the globulin precipitation test for kala azar.

C. M. W.

NAPIER (L. E.). **Kala-Azar : Notes on the Diagnosis and Treatment.**— *Indian Med. Gaz.* 1921. Nov. Vol. 56. No. 11. pp. 401–404.

This paper is a general account of kala azar as it occurs in Bengal. The disease is much more prevalent in Calcutta and the surrounding districts than is generally supposed. Of the patients who apply at the kala azar clinic at the Calcutta School of Tropical Medicine, about 70 per cent. are found to be definite cases of the disease. Both sexes are equally liable, and Hindus, Mohammedans and Christians are affected to the same extent. The patients are of all ages, from one to 60 years. The signs and symptoms of the disease are most characteristic at the ages of 4 to 14, and most severe between 14 and 24. In men, and to a less extent in women, over 35 a diagnosis from clinical signs alone is extraordinarily difficult to make. Frequently the only symptoms are long-continued fever unrelieved by quinine and spleen enlargement, and even the latter may not be marked. Although there are many cases which one can, on clinical evidence alone, definitely diagnose as kala azar, it is never safe to conclude that any case with enlarged spleen is not suffering from the disease. Except in a very small percentage of cases the final diagnosis must be made by the discovery of the parasite. In a very large number of cases diagnosis can be made by the culture method, but this is not a practical method during the hot weather in Calcutta. Spleen puncture, which the author has performed on some hundreds of cases without any accident, is the more usual method of diagnosis. The author gives a description of the technique employed by him in carrying out this operation.

The most accepted form of treatment is with tartar emetic. Though it is supposed that the potassium salt is more toxic than the sodium salt, this is not the author's experience, while he finds the potassium salt more efficacious. He uses a 1 per cent. solution, prepared fresh in normal saline at least every three days. If it is inconvenient to prepare a solution so frequently, it can be preserved by adding carbolic acid to the strength of 0·5 per cent. The first dose should be 1 cc., and this is increased by 1 cc. at each injection till a dose of 10 cc. is reached. If at any dose there are unpleasant symptoms, on the next occasion the dose should not be increased, and if the symptoms continue, the dose is decreased. The injections should be given three times a week. For debilitated patients and children the initial dose should be 0·5 cc., increased by 0·5 cc. at each injection. It will usually be found that for children up to 10 years of age the dose should not go beyond 5 cc. Details of the method of administering the drug intravenously by means of a syringe are given. As regards the duration of treatment, the author considers that for an adult who

responds readily a total of 2 gm. of the drug is sufficient. If, however, there has been a delay in the fall of the temperature, this should be increased to 3 gm. In no case should the treatment be discontinued till the white blood count has become normal. As subsidiary treatment it is advisable to put all patients who are at all debilitated on a digitalis mixture of some kind. That used by the author is :—

Tinc. digitalis	min. 5
Tinc. nux vomica	min. 5
Tinc. rhei co.	min. 20
Tinc. card. co.	min. 15
Aq. chloroformi	ad ½ oz.

The mixture is given for a few days before commencing antimony treatment and may be continued for the first few weeks. After this a mixture containing iron and quinine is useful, as malaria and kala azar often co-exist.

If the patient is very weak in condition when first seen it is usually advisable to withhold antimony treatment for a short time, during which an intramuscular injection of the following mixture can be given :—

Turpentine	1 part.
Creosote	1 „
Camphor	1 „
Olive oil	2½ parts.

The best site for the injection is in the gluteal region. It may cause some pain and even abscess formation, but this will have the beneficial effect of inducing a leucocytosis. Unfortunately the author omits to mention the quantity of the mixture to be injected. The injection is also described as being very useful during the course of antimony treatment when a patient who at first responds well commences to run a daily temperature of 100° F., followed by a rapid fall to normal.

C. M. W.

Klippel & Monier-Vinard. **Premier cas de kala-azar d'origine marocaine. Guérison par l'acétyl-aminophényl stibinate de soude (stibényl).**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Jan. 19. Year 38. 3rd Ser. No. 2. pp. 76–85. With 1 chart in text.

This paper gives a detailed description of a case of kala azar in a hospital nurse 20 years of age. It is of interest as being the first human case recorded from Morocco, where the canine disease has been known to occur since its demonstration there by Delanoë and Denis in 1916.

When the diagnosis was made the patient was much emaciated and was suffering from repeated attacks of fever. The disease was evidently well advanced. Treatment was commenced by oral and intramuscular injections of tartar emetic, which did not bring about any improvement. Intravenous injections of stibacetin were then made as follows :—July 20, 5 cgm. ; July 22, 12 cgm. ; July 24, 20 cgm. ; July 26, 30 cgm ; July 28, 20 cgm. ; July 31, 12 cgm. The patient by this time had shown such marked improvement, with complete disappearance of the fever, that she was taken to the country, where the treatment was continued during August by giving, at four days'

intervals, three injections of 20 cgm. and two of 30 cgm. Treatment was then withheld for three weeks, but was resumed on September 11, between which date and the 28th of the same month the following injections in centigrams were given :—30, 40, 50 and 40.

The patient made an uninterrupted recovery, and at the time of writing appeared to have been quite cured. At no time during the treatment did the injections produce any signs of intolerance, and the authors consider that stibacetin is a drug of remarkable therapeutic properties in the treatment of kala azar.

C. M. W.

Mallardi (Mario). **Il ricambio dell'antimonio nella Leishmaniosi interna.**—*Pediatria.* 1921. Oct. 1. Vol. 29. No. 19. pp. 878–885.

Di Cristina and Caronia (1916) stated that in three cases of infantile kala azar treated by intravenous injections of tartar emetic the urine became free from all traces of antimony in three days. In the present paper the author gives an account of the antimony excretion in four cases of the disease, which were treated either intravenously with tartar emetic or intramuscularly with stibacetin. The elaborate method of detecting antimony in the urine is fully described.

The results obtained, which are of importance from the point of view of the possibility of accumulation of antimony in the body, were as follows :—

If the case is one in which the condition is fairly good at the commencement of either treatment the antimony is completely eliminated from the body after two or three days. On the other hand, if the case is one in which the general condition is bad and injections of antimony have been administered for some time, it will be found that the excretion of the drug is retarded, the urine not becoming free till after the lapse of five to eight days. This is due to the defective metabolism of the body and to the decrease in the number of parasites, which have the property of breaking up the drug and thus facilitating rapid elimination.

These experimental results have a practical application. In the early stages of the treatment of cases which are not markedly debilitated it is safe to give injections every second day, but cases which have run a long course before treatment was commenced are less tolerant of the drug, which, owing to its less rapid excretion, must be given at longer intervals.

C. M. W.

Mallardi (Mario). **Degenerazione cistica della milza nel corso della leishmaniosi interna.** Cystic Degeneration of the Spleen in Infantile Kala Azar.]—*Pediatria.* 1921. Oct. 15. Vol. 29. No. 20. pp. 934–937.

The case recorded is one of infantile kala azar in Italy, in which there appears to have been a cystic degeneration of the spleen. The child had been treated vigorously with stibacetin, and when first seen by the author was not progressing favourably, owing to accumulation of antimony in the body. The treatment was suspended till all antimony had been eliminated. Intravenous injections of tartar emetic in small doses was then commenced, with the result that a complete cure was effected. A puncture of the spleen on one occasion

resulted in the abstraction of a clear limpid fluid, which contained only degenerating leucocytes, while blood from the spleen showed large numbers of parasites. It is concluded that the fluid was an indication of cystic degeneration of the spleen, such as may occur in malaria or myelogenous leukaemia.

C. M. W.

Legroux (Rene) & Jimenez (J.). **Facteur des croissances dans les cultures de** *Leishmania donovani.*—*C.R. Acad. Sci.* 1921. Dec. 19. Vol. 173. No. 25. pp. 1423–1425.

Experiments were conducted with the object of obtaining information on the nature of the active principle in N.N.N. medium which favours the growth of leishmania. Medium prepared with washed red cells gave no growth. The separated serum sometimes gave good results, at other times less favourable results. It was thought that this difference might depend upon the degree to which the white blood cells had been broken up during the process of defibrinating the blood.

Investigations of macerated organs of the body were then tested. After maceration at a temperature of 75° C. for 20 minutes, the liquid was separated and freed from any bacteria by filtration. In the case of the spleen and bone marrow filtrates good cultures resulted, while with that obtained from other organs there was either a poor growth or no growth at all. If during maceration a higher temperature, 90° or 100° C., was employed culture did not take place in the subsequently prepared medium. The authors point out that the leishmania appear to require a substance which can be extracted from leucocytes at a temperature of 75° C. and that this substance is destroyed at temperatures approaching 100° C. Similar results were previously obtained by them when working with the bacillus of influenza.

C. M. W.

Jemma (G.). **Cultura dei parassiti di Leishman dal sangue periferico e coltivabilità do essi in terreni con sangue umano.** —*Pathologica.* 1922. Feb. 1. Vol. 13. No. 317. pp. 71–73.

The investigations recorded in this paper were undertaken with the object of testing the view expressed by Giugni that in making cultures of leishmania from the peripheral blood of cases of kala azar the human serum itself often exerted an inhibitory influence on the growth of the flagellates. Caronia and Cannata, on the other hand, considered that the frequent failure to obtain cultures was due to the scarcity of the parasites in the peripheral blood.

The author prepared media with the blood of rabbits and human beings of various ages and made comparative cultures in the two media. As a result of his experience he concludes that the most usual cause of failure to obtain culture from the peripheral blood is the scarcity of parasites, that human blood does not, as a rule, hinder growth, but that the blood of certain individuals does exert a retarding effect.

C. M. W.

Pedroso (Alexandrino). **Biologia da Leishmania.**—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1921. May. Vol. 4. Ser. 2. No. 3. pp. 33–34.

1. In experiments performed with the object of testing whether Leishmania develops under anaerobic conditions the results were negative.

2. In examining the various ingredients of NICOLLE's medium necessary for the adequate development of Leishmania the following points were observed :—

(*a*) That the rapidity and intensity of the culture increases in proportion to the quantity of blood up to 15 per cent., the point of maximum development, after which there is no notable variation up to 30 per cent. ; from 30 per cent. onwards it becomes useless and even prejudicial.

(*b*) That a percentage of 0·3 to 0·4 of NaCl is more favourable to initial development than the percentage in the usual medium.

(*c*) That the best formula for culture medium is the following :—

Water	..	..	..	..	..	1 litre.
Agar	..	..	..	..	..	20 gm.
NaCl	..	..	..	..	..	3 to 4 gm.

(*d*) That there is a disadvantage in mixing blood and agar at 56° C.

(*e*) That the addition of 0·8 cc. of N/10 HCl appears favourable to growth, which does not take place with the addition of 1·0 cc. and over.

(*f*) That with acid media, as with alkaline, it is easy to distinguish tubes in which Leishmania cannot grow, as the excessive acidity or alkalinity changes the colour from red to dark.

(*g*) That the development of Leishmania is in proportion to the acidity or alkalinity of the media and that in slightly acid or alkaline media the latent period tends to be shorter.

3. Leishmania develop in media not containing haemoglobin.

(*a*) Leishmania live a few hours in pure human serum, and in sheep-, rabbit-, dog-, and goat-serum.

(*b*) In the same serum prepared according to the process of LEEFDLER [? LOEFFLER], with physiological solution instead of broth, Leishmania dies within one or two days, except in the case of goat-serum, in which it remains alive for the greatest length of time.

C. M. W.

SERGENT (Ed. et Et.), PARROT (L.), DONATIEN (A.) & BÉGUET (M.). **Transmission du clou de Biskra par le phlébotome** (*Phlebotomus papatasii*, **Scop.**).—*C.R. Acad. Sci.* 1921. Nov. 21. Vol. 173. No. 21. pp. 1030–1032.

The authors point out that the Sergents suggested in 1905 that Phlebotomus was the probable vector of oriental sore at Biskra. WENYON in 1911, and PATTON in 1919, considered this fly as a likely carrier in Mesopotamia. The experimental proof of this hypothesis was, however, lacking.

During the summer of 1921 the authors instituted an experiment with the object of testing the possibility of the carriage of the disease by sand flies which were collected at the endemic foci of Biskra, El-Outaya and El-Kantara, and despatched on a three to four days' journey to the Pasteur Institute in Algiers, where oriental sore does not occur. In all, 2,346 flies were sent, and these comprised *P. papatasii* 2,282, *P. perniciosus* 8, and *P. minutus* var. *africanus* 56. Of these, 559 which reached their destination alive were divided into 23 batches. As they refused to feed they were crushed in saline solution, which was subsequently used to inoculate volunteers by scarification of the skin of the arm. One experiment was positive. This resulted from a batch of 7 *P. papatasii*, the only survivors of 94 flies captured at the military hospital of Biskra on August 16 and 17, 1921. On August 20, the 7 flies were crushed in saline at Algiers and inoculated in the skin of the arm. The wound healed without any trouble. On November 13, 2 months and 24 days later, a small papule was noted at the same spot On the following day examination of the

papule revealed numerous leishmania and the picture characteristic of oriental sore. It is concluded that the sand-flies from endemic foci of oriental sore can harbour a virus which will produce in man a cutaneous leishmaniasis which resembles oriental sore both clinically and pathologically.

C. M. W.

Aragão (Henrique de Beaurepaire).—**Transmissão da Leishmaniose no Brazil pelo** *Phlebotomus intermedius.*—*Brazil Medico.* 1922. Mar. 18. Year 36. Vol. I. No. 11. pp. 129–130. With 1 fig.

Influenced by the successful transmission of oriental sore by means of *Phlebotomus papatasii* by the brothers Sergent and their collaborators, whose paper is reviewed above, the author of the present note carried out similar experiments with the Brazilian fly, *Phlebotomus intermedius*, Lutz and Neiva. The work was undertaken in an endemic centre of leishmaniasis in Brazil, where *P. lutzi* could be easily obtained. Flagellates resembling culture forms of leishmania were found in the flies. On October 28, 1921, five flies which had fed upon a case three days before were crushed in saline solution and the emulsion inoculated in the skin of a dog's nose. At the end of January, 1922, there was some evidence of reaction at the site of inoculation. A small nodule developed in which scanty, but absolutely typical, leishmania were found on February 10. The nodule broke down and gave rise to a small ulcer which is shown in a photograph of the dog's head which illustrates the paper. The author remarks that it is evident that *Phlebotomus intermedius* is capable of carrying the virus of *Leishmania tropica*.

[In both this experiment and that conducted by Sergent and his co-workers the successful inoculation proves that the virus of oriental sore can survive in the fly for three days. In Aragão's experiment the flies actually fed on a case three days before, while in that conducted by the French observers it is just possible, though perhaps improbable, that one or more of the flies had actually fed on a case shortly before they were caught at Biskra. Without wishing to be hypercritical it seems to the reviewer that the absolute proof that the fly was not merely acting as a mechanical carrier has not been obtained. It is probable that crushed bed bugs would give rise to a sore if an interval of only three days had elapsed since they had fed on a case of the disease.]

C. M. W.

Parrot (L.). **Recherches sur l'étiologie du bouton d'orient (clou de Biskra). Etudes sur la biologie des phlébotomes en milieu endémique.**—*Bull. Soc. Path. Exot.* 1922. Jan. 11. Vol. 15. No. 1. pp. 80–92.

This paper, which is mainly entomological, contains an account of investigations into the bionomy of species of Phlebotomus in the endemic focus of oriental sore in the neighbourhood of Biskra. The enquiry was made on account of the increased importance of these flies resulting from the positive production of oriental sore by means of a virus obtained from *P. papatasii*, an account of which is given above. The habit of *P. minutus* var. *africanus* of feeding on the gecko (*Tarentola mauritanica*) is noted, and reference is made to the suggestion that the gecko may possibly harbour the virus of

oriental sore. It is stated, however, that there are reasons for suspecting that *P. papatasii* may be the chief, if not only, carrier of the disease. The method of feeding of the flies is noted, and it was observed that *P. minutus* var. *africanus*, while biting, constantly passed drops of clear fluid per anum which became distributed on the skin. This habit may be possessed by other species and the possibility of its affording an explanation of the method of dissemination of intestinal flagellates is emphasized.

C. M. W.

Cornwall (J. W.). **Note on the Histo-Pathology of a Non-Ulcerated Oriental Sore.**—*Indian Jl. Med. Res.* 1922. Jan. Vol. 9. No. 3. pp. 545–547.

From the study of sections of an oriental sore the author comes to the following conclusions as to the course of events in the development of a sore. The parasite is probably introduced into the dermis, for not a single cell of the epidermis was found infected. The parasites are not found in the cells of the sweat glands, sebaceous glands or hair follicles. The mononuclear endothelial cells are the breeding ground of the parasite, and these large cells proliferate extensively and push their way in all directions, especially towards the surface of the skin. The fibrous tissue of the dermis is split apart by columns of invading cells and becomes a mere network. New capillaries are formed to meet the requirements of the new tissue. When the endothelial cells reach the Malpighian layer of the epidermis the latter becomes reduced to a thin membrane, the slightest injury to which admits pyogenic organisms and commences the ulcerative process. The ulceration is regarded as a curative process and prevents the lateral spread of the parasites and the consequent destruction of large areas of the integument. At the periphery of the lesion are small cells with round, deeply-staining nuclei. Some of these are plasma cells, others migratory cells. There appear to be no extravascular polynuclear leucocytes. The small cells surrounding the lesion have some influence in limiting its extension.

C. M. W.

McKinstry (W. H.). **A Serological Investigation of Oriental Sore.**—*Brit. Med. Jl.* 1922. Feb. 4. p. 185. & *Jl. Roy. Army Med. Corps.* 1922. Mar. Vol. 38. No. 3. pp. 216–217.

Owing to the fact that very discordant statements have appeared in the literature relating to the occurrence of a positive Wassermann reaction in oriental sore, the author tested 28 cases of the disease by the technique adopted at the Military Hospital, Rochester Row. Although the cases were in all stages of the disease, in only one was a positive Wassermann reaction obtained, and this one was suffering from concomitant syphilis. In all the cases except one diagnosis was established by the finding of the parasite.

C. M. W.

Cartron & Bacqué. **Notes sur le clou de Biskra chez les tirailleurs sénégalais à Biskra (Algérie).**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. July–Aug.–Sept. Vol. 19. No. 3. pp. 303–319.

Amongst the Senegalese garrison stationed at the oasis of Biskra oriental sore was a serious cause of invaliding. It was especially noted amongst those who had passed the months of July, August and

September in this endemic focus of the disease. The incubation period was usually about one month.

After various treatments had given unsatisfactory results, heliotherapy was tried. The sun was allowed to act on the sore directly or with the help of a biconvex lens. Applications of ointment of oxide of zinc 10 in 35 or methylene blue 1 in 20 were made at the same time. A permanent cure resulted in about a month, whereas other treatments required three, six, or even nine months to produce healing.

C. M. W.

CALICETI. **Cutaneous Leishmaniasis.**] — *L'Oto-Rhino-Laryngologie Internationale.* 1920. Dec. [Summarized in *Brit. Med. Jl.* (Epitome of Current Med. Literature). 1922. Jan. 21. p. 11.]

Two cases of Sicilian oriental sore treated by local injections of emetine hydrochloride are recorded. Each case, which had lesions on the ear and nose, received two injections of 8–10 cgm. of the drug, and cure resulted in three weeks. In the two cases it was found that the blood contained antibodies, and deviation of the complement was obtained by using an antigen extracted from the spleen of a kala azar case. No reaction resulted when the antigen employed in the Wassermann test was used.

C. M. W.

DE AGUIAR PUPO (João). **Duos formas raras de leishmaniose tegumentar : lymphangite leishmaniosica simulando a esporo-trichose ; leishmaniose maligna numa crianca de 3 annos.** [Two Rare Forms of Cutaneous Leishmaniasis : Leishmanial Lymphangitis simulating Sporotrichosis ; Malignant Leishmaniasis in a Three-year-old Child.]—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1921. June. Vol. 4. 2nd Ser. No. 4. pp. 97–99. With 3 plates.

The paper describes two cases of cutaneous leishmaniasis seen in Brazil. The first case, in a man of 47 years of age, is remarkable in the extensive involvement of the lymphatics of the leg. A primary lesion occurred above the ankle, and from this the lymphatics running up the leg became infected. A series of nodules developed in a line between the primary lesion, which had healed, and the knee. These nodules had broken down and produced a row of large ulcers, in which leishmania were demonstrated.

The second case was in a child three years old. There were numerous ulcers about the face, arms and legs, as well as involvement of the nasal mucosa.

The first case was treated with tartar emetic, with excellent results, and the second with disodoluargol, which produced healing of all but the mucosal ulcers of the nose. The latter condition improved appreciably after anthelminthic treatment directed against a concomitant ankylostome infection.

C. M. W.

MEHRDORF (Robert). **Ueber Espundia.**— *Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 1. pp. 1–5. With 1 plate.

Writing of espundia in Brazil, the author calls attention to a type of the disease which he names *Espundia hypertrophicans*, on account of the large granulomatous tumours which are produced. These may

occupy an area as large as the palm of the hand, and because of their cauliflower appearance may be mistaken for cancer of the skin. Attention is drawn to the frequency of involvement of the nasal and buccal mucosae, which always occurs as a secondary complication of the purely cutaneous lesion. The paper is illustrated by six photographs showing various types of lesion met with.

C. M. W.

i. Remlinger (P.). **Un cas de Kala Azar infantile observé au Maroc.**— *Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. pp. 240–241. With 1 plate.

ii. Cannata (S.). **Leishmaniasi interna. Relazione al VI Congresso Medico Siciliano.**—*Riv. San. Siciliana.* 1921. No. 9. [Summarized in *Ann. di Med. Nav. e Colon.* 1921. Sept.–Oct. Year 27. Vol. 2. Nos. 3–4. pp. 651–652.]

di Cristina (G.). **Terapia della leishmaniasi interna. Relazione al VI Congresso Medico Siciliano.**— *Ibid.* [Summarized *l.c.* p. 652.]

iii. Smith (D. King). **Oriental Sore. Report of Four Cases.**— *Arch. Dermat. & Syph.* 1922. Jan. Vol. 5. No. 1. pp. 69–72. With 2 text figs.

i. A case of infantile kala azar in a child six years of age occurring in Tangiers. This is the second case to be recorded from Morocco.

ii. These two notes contain brief summaries of the addresses given by the authors at the Sixth Congress of Medicine held in Sicily in 1921.

iii. A description of four typical cases of oriental sore.

C. M. W.

RELAPSING FEVER.

Bates (Lewis B.), Dunn (Lawrence H.) & St. John (Joe. H.). **Relapsing Fever in Panama. The Human Tick,** *Ornithodoros talaje*, **demonstrated to be the Transmitting Agent of Relapsing Fever in Panama by Human Experimentation.**—*Amer. Jl. Trop. Med.* 1921. July. Vol. 1. No. 4. pp. 183–210. With 4 charts in text.

This paper contains an account of experiments conducted with *Ornithodorus talaje* and relapsing fever, which prove conclusively that this tick is the transmitting agent of the disease in Panama. Six cases of relapsing fever were admitted to the Ancón Hospital during the last week of March and the first week of April, 1921. They came from two parties of boys who had gone hunting to Arraiján on March 15 and March 21. As the boys gave accounts of being badly bitten during the night an investigation of the locality was made, with the result that numerous *Ornithodorus talaje* were discovered in the huts they had occupied. These were collected for experiments, which have resulted in the incrimination of the tick as the vector.

Two white rats were infected by inoculating them with suspension of macerated naturally-infected ticks. Spirochaetes indistinguishable from the human blood forms were demonstrated in the coelomic fluid of the ticks. A monkey, *Macacus rhesus*, was infected by feeding a number of nymphs which had fed as larvae on an infected rat 22 days before. It was shown that the blood of an infected rat produced infection on injection in a human being. Another man was infected by hypodermic injection of a suspension of a naturally-infected crushed tick, while a third contracted the disease after being bitten by naturally-infected ticks.

Rats, mice and guinea-pigs were infected by inoculation of infected blood. In rats the spirochaetes usually appear in the blood in 24 to 48 hours. They increase in numbers during the second and third days and then become scanty and remain so up to the thirteenth day, when they disappear. Occasionally there is a return of spirochaetes to the blood stream. In mice the course of the infection resembles that in rats, while in the monkey the reaction is comparable to that of man. One monkey had two relapses, and another one. Some details of the appearance and structure of the spirochaetes in the blood and culture in Noguchi's medium are given. Multiplication by transverse fission was definitely observed, while the movement of granules on the spirochaetes was noted. A granule in the medium would sometimes come in contact with the organism and after moving to and fro along the body leave it again.

C. M. Wenyon.

Noc (F.) & Nogue. **Ictères épidémiques et spirochètes au Sénégal.** —*Bull. Soc. Path. Exot.* 1921. Oct. 12. Vol. 14. No. 8. pp. 460–470.

During 1916, 1919 and 1920–21, the authors had experience of epidemics of febrile jaundice which broke out amongst troops undergoing instruction in Senegal. The disease was ushered in by fever, headache and marked jaundice. The spleen and liver were enlarged

and the urine contained large quantities of albumoses, and increased amounts of urobilin. There was sometimes epistaxis and arthritic pains. The temperature fell to normal and the jaundice disappeared. A few days later there was another attack, with return of the jaundice. As many as four such relapses were noted. In fatal cases a typhoid condition was present associated with delirium, bilious and black vomit, and scanty but highly albuminous urine. Post-mortem examination revealed general icterus, degeneration of the liver, presence of black blood in the stomach and intestine, and great congestion of the kidneys.

Discussing the diagnosis, yellow fever is ruled out, as in the fatal cases jaundice had disappeared before the end, while the natives were more severely affected than Europeans. It is evident that before a diagnosis of yellow fever can be made in the case of a native of Africa it is essential to exclude relapsing fever and icterohaemorrhagic fever. The symptoms shown by the majority of cases were those well known in relapsing fever. Netter has noted jaundice in at least 25 per cent. of cases of relapsing fever, while Nicolle, Blaizot and Conseil observed it in 53 of 160 cases. In 16 of the latter series it was marked. Furthermore, albuminuria occurred in 31 cases.

The authors discovered spirochaetes of the recurrent type in the blood of some of their cases, while spirochaetes were also present in the urine as in relapsing fever. Young guinea-pigs were infected through scarified areas of the skin. As regards icterohaemorrhagic fever it is known that the virus is present in rats in Senegal, and one case showed spirochaetes and leptospira in the urine. The latter, however, did not produce infection in guinea-pigs. It is concluded that the disease was really relapsing fever, though it is admitted that the possibility of a concurrent infection with *Leptospira icterohaemorrhagiae* cannot be absolutely excluded. A. Léger has noted that the wild rat of Senegal may harbour a spirochaete which resembles that of relapsing fever, both morphologically and in its pathogenicity to monkeys. An incomplete search did not reveal *Ornithodorus moubata*. On the other hand all the patients were lousy when admitted to hospital. In some of the lice spirochaetes like those occurring in the blood were discovered.

It is evident that if this disease is in reality relapsing fever it has a direct bearing on the question of the occurrence of yellow fever in Africa and has to be considered in all cases in which a diagnosis of this disease is made.

C. M. W.

Sergent (Edm.) & Foley (H.). **Fièvre récurrente et ictère.**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 632–633.

The paper by Noc and Nogue reviewed above has led the authors of this note to record their experiences of an epidemic of relapsing fever observed in Algeria during 1907–14. Amongst the natives relapsing fever is of the classical type and no jaundice was noted. The virus was studied in the monkey, with blood from which two Europeans became accidentally infected by way of the conjunctiva. In both cases there was an incubation period of eight days. One case was of the ordinary type, the other was more severe. In the latter, with the advent of fever at the first attack there was marked jaundice but no spirochaetes could be found in the blood. The jaundice became more marked, and in spite of blood examinations made every two hours

spirochaetes were only discovered on the third day. An injection of 0·6 gm. of arsenobenzol cut short the disease. The virus, which in the native does not produce jaundice, may in the European give rise to a condition which in the absence of spirochaetes causes uncertainty in diagnosis.

C. M. W.

Büttner (Georg). **Drei Fälle von Febris recurrens, ein Beitrag zur Differentialdiagnose des Rückfallfiebers.** [Three Cases of Relapsing Fever: Contribution to its Differential Diagnosis.]—*Berlin. Klin. Woch.* 1921. Oct. 31. Vol. 58. No. 44. pp. 1296–1299.

The paper gives in detail the clinical history of three cases of relapsing fever which occurred sporadically in Germany. The author points out the difficulty of making a diagnosis in such cases, which occur quite apart from any epidemic, and discusses at some length the various diseases with which relapsing fever can be confused when the physician is off his guard and does not pay particular attention to the temperature chart, or neglects to make the necessary blood examination.

C. M. W.

Roar (H. E.). **The Wassermann Reaction in Relapsing Fever.**—*Brit. Jl. Experim. Path.* 1922. Feb. Vol. 3. No. 1. pp. 59–60.

Eighteen cases of relapsing fever were examined from the point of view of the Wassermann reaction. Eleven gave a positive reaction at some stage of the disease, but six of the seven negative cases were only examined once. Of the cases tested repeatedly the positive reaction persisted in three out of nine for 17 to 21 days, while all the others had become negative 8 to 13 days after the onset of fever. It is evident that a transient positive Wassermann reaction may be expected as a constant phenomenon during the acute stages of relapsing fever.

C. M. W.

Weichbrodt (R.). **Studien bei der Recurrensinfektion zwecks Beeinflussung von Psychosen.** [Studies on the Effects of Relapsing Fever Infections on Psychoses.]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1. Teil. Orig. 1921. Vol. 33. No. 3. pp. 267–282. With 3 charts in text.

The investigations recorded in this paper were undertaken with the object of testing the effect of an infection with relapsing fever spirochaetes in various psychoses. Injection was made with the blood of mice infected with different strains of spirochaetes. The conclusions reached were as follows :—

1. By inoculating mice it was found that spirochaetes were constantly present in the blood of men unless the intervals between the relapses were unduly prolonged.

2. The Georg Speyer-Haus strain, which is not pathogenic to human beings, could be demonstrated in the blood up to the second day after inoculation.

3. Reinfection was not possible even after the expiry of 18 months since a previous infection.

4. In the cerebro-spinal fluid spirochaetes were present two or three days after the first attack. Their occurrence does not appear to depend upon the relapses as it does in the blood. Thus, if mice are inoculated with blood shortly after a relapse infection may not reveal itself for nine days, whereas in mice inoculated with cerebro-spinal fluid taken at the same time infection may occur in two or three days.

5. Serum and cerebro-spinal fluid of recovered cases may hinder or entirely prevent an infection in mice, the former to a higher degree than the latter.

6. Hyperleucocytosis did not occur in all the cases inoculated, but in some of them the spirochaetal infection produced a marked improvement in the nervous condition.

C. M. W.

Kligler (I. J.) & Robertson (O. H.). **The Cultivation and Biological Characteristics of** *Spirochaeta obermeieri* (*recurrentis*).— *Jl. Experim. Med.* 1922. Mar. 1. Vol. 35. No. 3. pp. 303–316.

The authors have experimented with various media with the object of obtaining information as to the factors which govern the growth of *Spirochaeta obermeieri*. They have found that success depends largely on the reaction (pH) of the medium, and they have arrived at the following method of its preparation:—

The basic medium consists of horse serum or rabbit serum diluted with one to two parts of saline solution or ascitic fluid undiluted. To this basis is added 1·0 per cent. peptone broth. This is done by adding 1·0 cc. of a 10 per cent. broth to each 10 cc. of fluid. The reaction is adjusted to pH 7·2 and the medium is distributed in 3–4 cc. amounts in tubes about 1 cm. in diameter. Each tube is then inoculated with one drop of infected blood, or, if subcultures are being made, with 0·1 cc. of culture, after which the medium is covered with a layer of oil 1·5 cm. in height. In the case of subcultures it is well to add one drop of fresh rabbit's blood just before covering with oil. The tubes are incubated at a temperature of 28°–30° C.

It was found that the diluted sera or ascitic fluid alone became progressively more alkaline on exposure to air, but that a balanced reaction could be secured by the addition of the peptone broth, which acted as a buffer, and by covering with oil. The reaction limits of growth and survival are between pH 6·8 and 8·2, with the optimum at pH 7·2 to 7·4. *Spirochaeta obermeieri* is a strict aerobe, so that to permit it to have adequate aeration the layer of oil must not be more than 1·5 cm. in height.

C. M. W.

Stevenson (A. C.). **The Incidence of a Leptospira in the Kidneys and of Parasites in the Intestines of One Hundred Wild Rats examined in England.**— *Amer. Jl. Trop. Med.* 1922. Jan. Vol. 2. No. 1. pp. 77–81. With 1 plate.

An investigation of the incidence of natural infection with *Leptospira icterohaemorrhagiae* amongst wild rats in England is recorded in this paper. Coles, in Bournemouth, had found 9 infected out of 100 examined, while Fullerton, examining 101 in the London area during the period July to November, found 4 infected in the latter month. He concluded that there was a seasonal incidence during the winter months.

The author of the paper under review examined two batches of 50 rats, mostly from the London area. The first batch was examined between February 2 and March 15, and the second between May 2 and June 22. Of the first batch 12, and of the second 18, were found infected. This gives an incidence of 30 per cent. All the positive rats were caught in London, except one, which was taken in Hampshire. Apart from the two series, guinea-pigs were infected from two rats which came from Cheshire and Kent. It was found that examination of smears of the kidneys stained by Giemsa or sections of these organs stained by Levaditi's method gave more reliable results than the inoculation of guinea-pigs, which only became infected with certain strains.

The urine taken from the bladder was examined by dark ground in 52 cases. The organism was found in 9 of these. Of these 52 rats 18 were proved to have a kidney infection.

It appears that there may be a high incidence of infection amongst rats in areas in which the human disease is practically unknown, and that there does not seem to be any definite seasonal incidence of infection.

C. M. W.

Iturbe (Juan) & González (Eudoro). **Observaciones referentes a la presencia de la** *Spirochaeta icterohemorragiae* **en la rata doméstica de Caracas. Datos acerca del diagnóstico bacteriológico y epidemiologíade la enfermedad de Weil. Pseudo-**—*Sp. icterohemorragiae.—Contribución del Laboratorio Iturbe en el 3er Congreso Venezolano de Medicina.* 1921. pp. 11–20. With 1 plate.

In a previous publication Iturbe and González (1918) recorded the presence of *Leptospira icterohaemorrhagiae* in the rats of Caracas [*see* this *Bulletin*, Vol. 13, p. 277]. The present paper describes the methods which were adopted to establish the identity of the organism in question.

C. M. W.

Kaneko (Renjiro). **Zur Kultur der** *Spirochaeta icterohaemorrhagiae* **und der** *Spirochaeta hebdomadis.—Cent. f. Bakt.* 1. Abt. Orig. 1921. Dec. 17. Vol. 87. No. 5. pp. 345–354.

The investigations recorded in this paper were undertaken with the object of discovering the best medium for the growth of *Leptospira icterohaemorrhagiae* and *L. hebdomadis*. The following summary of the results is given :—

1. Human ascitic fluid gives a good growth if a little blood is added.
2. Various sera of animals, especially that of rabbits, may be used with success.
3. Rabbit serum gives the best result when diluted with 2–5 parts of Ringer's solution.
4. In the successful culture the presence of the colouring material of the blood is necessary.
5. The addition of agar to the medium favours growth.
6. The addition of a layer of paraffin on the liquid or semi-solid media is advisable, though not absolutely essential.
7. A slight alkalinity is the most favourable reaction for the medium.
8. The most rapid growth takes place at the blood temperature. When growth has taken place cultures can be kept at the ordinary laboratory temperature.

9. In culture the organisms gradually change as regards their capacity for multiplication.

10. As a result of his investigations the author recommends the following media :—

(*a*) Liquid medium. A drop of rabbit's blood is added to 2–3 cc. of a dilute rabbit serum (1 in 2–5 of Ringer's solution). The mixture is kept for 30 minutes at a temperature of 56°–58° C., after which a layer of sterile paraffin is superposed.

(*b*) Semi-solid medium. The above fluid is rendered semi-solid by the addition of 0·3 per cent. of ordinary agar. Three grams of agar are dissolved in 100 cc. of Ringer's solution and to each cc. of this is added 9 cc. of the dilute serum. A layer of sterile paraffin is added after heating as in (*a*).

C. M. W.

YAKIMOFF (W. L.). **Sur la question des spirochètes de l'intestin de l'homme.**—*Bull. Soc. Path. Exot.* 1921. Nov. 9. Vol. 14. No. 9. pp. 532–535. With 1 text fig.

The organism described in this paper is one which, along with various protozoa, appeared in culture medium inoculated with the faeces of a patient in Petrograd. From the fact that the spirochaete was not seen in stained smears of the faeces and that the protozoa which appeared in the cultures were undoubtedly free-living organisms, though the author assumes them to be intestinal parasites, it may safely be concluded that there is no evidence that the spirochaete is an intestinal organism at all. Like the protozoa, it is very probable that the organism gained entrance to the faeces as an external contamination.

The author names the spirochaete *S. zlatogorovi* and groups it with the intestinal spirochaetes. It cannot, however, be too forcibly emphasized that the describing as intestinal parasites any organisms which turn up in media inoculated with faeces which have been exposed to external contamination is to be deprecated. The author of this paper, in conjunction with various co-workers, has recently described as intestinal parasites of man and animals a large number of protozoa and other organisms which have been obtained in this way. Quite apart from external contamination, cysts of free-living organisms are constantly passing through the intestine and will give rise to cultures in stale faeces. Neglect of this fact only leads to needless confusion in the literature.

C. M. W.

SCHNEEMANN (Erich). **Vergleichende Untersuchungen über neuere Spirochätenfärbungen.**—*Cent. f. Bakt.* 1. Abt. Orig. 1921. Mar. 15. Vol. 86. No. 1. pp. 84–89.

An investigation of the various modifications of the Fontana stain for spirochaetes has led the author to the conclusion that dark field observations give much more reliable results as to the presence or absence of spirochaetes than do stained films. He has found that of staining methods that advocated by BECKER gives the best results. It is carried out as follows :—

1. Make thin serum preparations.
2. Drop on Huge's solution :—

Acetic acid	1·0 cm.
Formalin	20·0 cm.
Water	100·0 cm.

The liquid should be renewed once or twice during one minute and the film then washed.

3. Mordant (10 per cent. tannic acid + 1 per cent. carbolic acid), and warm over the flame till steam rises for half a minute. Wash.

4. Stain warm for half to three-quarters of a minute with Ziehl's carbolfuchsin :—

5 per cent. carbolic acid	100·0 cc.
Saturated alcoholic fuchsin solution..	10·0 cc.

The film is then washed in water, dried and examined.

C. M. W.

i. Rodino (Nicola). **Una epidemia di febbre ricorrente ad Itala nella Somalia italiana.**—*Giorn. di Med. Milit.* 1922. Feb. 1. Vol. 70. No. 2. pp. 90–93.

ii. Yakimoff (W. L.). **Sur la question du** *Spirochaeta bronchialis* **Castel. en Russie.**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 633–634.

iii. Yakimoff (W. L.) & Solowzoff (A. S.). **Traitement de la fièvre récurrente par le "Luargol" de Danysz.**—*Ibid.* p. 633.

i. The description of a small outbreak of relapsing fever seen by the author in Italian Somaliland. There appear to be no features of special interest.

ii. During the examination of 157 specimens of sputum sent to the laboratory for diagnosis of tuberculosis, spirochaetes were found 29 times. As these correspond in size with those seen by various observers in the condition caused by *Spirochaeta bronchialis*, it is assumed that this disease exists in Russia.

iii. Luargol of Danysz in a single dose of 0·2 gram for a man of ordinary weight will bring about a cure of relapsing fever in 100 per cent. of cases. Smaller doses may be followed by relapse.

C. M. W.

AMOEBIASIS AND DYSENTERY.

Amoebiasis.

Colville (H. C.). **Four Cases of Amoebic Dysentery.**—*Med. Jl. Australia.* 1922. Jan. 28. 9th Year. Vol. 1. No. 4. pp. 96–97.

This paper is a brief report of four additional cases of amoebic dysentery apparently contracted in Australia (see paper by Dew, page 329). The first patient, who was seen in August, 1920, was in first-class physical condition, and had suffered from diarrhoea for two and a half years. The remaining three patients were his mother, sister and brother, all of whom improved on emetine, though relapses have been frequent.

P. H. Manson-Bahr.

Connor (Roland C.). **The Combined Bismuth-Emetine Treatment for Amebic Dysentery and Amebiasis.** –*Proc. Med. Assoc. Isthm. Canal Zone.* 1918. July–Dec. Vol. 11. Pt. 2. pp. 19–27.

The following course of treatment has been adopted by Connor in the Ancon Hospital from May, 1914, up to August, 1918. A preliminary dose of 2 oz. of castor oil is followed four to six times a day, according to the severity of the symptoms, by a " heaping teaspoonful " of bismuth subnitrate well mixed with 4 to 6 oz. of water. If the bowels are opened frequently (10 to 20 times a day) bismuth is given every three hours, and then every four hours, till the patient has no stool for 24–48 hours ; and then a dose of castor oil, and afterwards the bismuth three times a day. A normal saline irrigation is ordered twice daily when there is evidence of an extensive colitis. Emetine is given in four treatments three to five days apart in severe cases, and in three treatments four to five days apart in mild infections. Rarely is less than 1 gr. given daily to an adult, unless the debility is very great. Often emetine is ordered in doses of 1 gr. twice a day eight hours apart on two or three successive days, or 1 gr. a day in three successive days, followed by an interval of three days. The smallest quantity of emetine given an individual was 3 gr., the largest 17½ gr. ; the average per patient is about 8 to 10 gr. More than 100 amoebic dysentery cases have been thus treated since 1914, and, as far as can be ascertained, only one has relapsed.

P. H. M.-B.

Lichtenstein (A.). **Therapeutische moeilijkheden bij de amoebiasis van het darmkanaal.** [Therapeutic Difficulties in Amoebiasis of the Intestinal Tract.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 5. pp. 540–550.

The author considers diarrhoea to be a possible symptom of emetine poisoning, and quotes two cases to prove this. Worm infection, in his opinion, badly interferes with the healing tendency of amoebic dysentery, and chenopodium oil treatment very often has a beneficial influence. In cases where the stools remain liquid without apparent reason the author saw good results after injections of neosalvarsan. Internal treatment with this drug in capsules gave no better results. The author is in doubt whether neosalvarsan acts as well in non-syphilitic cases as in syphilitics. In his cases it was difficult to exclude syphilis.

W. J. Bais.

Furuichi (T.). [**On the Perityphlitis caused by the Dysentery Amoeba.**] —*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. of Formosa*). 1921. Nov. 30. No. 219. p. 2. [English Summary.]

Of the 85 patients with amoebic dysentery in the Taichu Hospital during the last five years, the author found in three cases perityphlitis as a sequel. All were cured by emetine. P. H. M-B.

Rogers (Leonard). **Lettsomian Lectures on Amoebic Liver Abscess: Its Pathology, Prevention, and Cure.** *Lancet.* 1922. Mar. 11 & 25 & Apr. 8. pp. 463 469. With 1 chart; pp. 569–575; 677–684. With 1 chart. Abstract in *Brit. Med. Jl.* 1922. Feb. 11, 18, & Mar. 4. pp. 224–225; 264–266; 345–347.

In the Lettsomian lectures Rogers has summarized in a succinct form his well-known views upon the etiology, diagnosis and treatment of amoebic liver abscess. He associated the constant presence of amoebae with liver abscess in 1902 on examining the pus removed at operation. In 18 cases he found amoebae in the pus in four only, but in scrapings of the abscess wall they were present in every case but one. In 20 autopsies he found the organisms in the bowel wall in 19. Generally the pus proved to be sterile; out of 24 cultures, no growth was obtained in 15, or 62 per cent.; at autopsy 86 per cent. were sterile; thus *Entamoeba histolytica* was indicted as the causative organism. That hepatic abscess followed antecedent dysentery he was able to prove in 45 necropsies; evidence of active amoebic dysentery was found in 78 per cent. and scars of dysenteric lesions in 20 per cent. The dysenteric lesions in cases of large liver abscess were limited to the caecum in 13 out of 36 cases, and were restricted to small areas of the large gut in 23; the dysenteric process was latent in all. Taking all facts into consideration, Rogers considers that in slight or latent amoebic colitis, from which large abscesses usually result, comparatively few amoebae reach the liver, the vast majority undergoing degeneration in the vessels; this condition produces amoebic hepatitis. But when the amoebae reach some part of the liver in such numbers as to cause clotting of several small veins, and thus to produce necrosis, permitting the escape of amoebae into the soft tissues, an abscess results.

In about 70 per cent. of cases the abscess is single. Among 38 cases of more than one abscess, two were found in 44·7 per cent., three in 26·3 per cent., four in 18·4 per cent., and over four in 10·6 per cent.

After the opening of a large liver abscess a secondary bacterial infection appeared to be inevitable.

The reason why aspiration of liver abscess was not appreciated until it was again advocated by Rogers apparently was because it had not been combined with specific medicinal treatment. Rogers gave up quinine as an irrigant after discovering the greater value of emetine.

While maintaining that the method of repeated aspiration combined with specific medication is the method of election, Rogers allows that open operation is still necessary in certain circumstances. The records of the British Army in India collected over 14 years show 2,661 cases treated by the open operation, with a mortality of 56·7 per cent.; 111 cases, collected from various sources, treated by aspiration show a mortality one-fourth of the former figure.

In the course of time Rogers became convinced that ipecacuanha was a valuable drug in the prevention of hepatic suppuration.

The author ascribes the cirrhosis of the liver so frequently encountered in India to long-continued amoebic irritation of the portal branches in amoebic dysentery.

Since the introduction of the ipecacuanha treatment and its late improvements (emetine), the incidence of amoebic disease has diminished. The admissions for liver abscess to the European General Hospital, Calcutta, have fallen by half during the years 1915-21 as compared with figures obtained previous to that period.

P. H. M-B.

Langley (George J.). **The Difficulties in Diagnosis and Treatment of Hepatic Abscess.**—*Brit. Med. Jl.* 1921. Dec. 24. pp. 1073-1074. With 1 chart in text.

The present relatively high frequency of hepatic abscess is the result of oversea service during the recent war. The fact that a patient has had a liver abscess in the past, even when surgically treated, by no means excludes the development of a second abscess at some much later date. Two cases illustrative of this point are cited, in one of which an abscess recurred after seven years. Cases presenting the syndrome of dysentery, pyrexia, leucocytosis, hepatic pain and enlargement, even when the right dome of the diaphragm is pushed up and fixed, may still be examples of acute amoebic hepatitis. It is this condition which is specially amenable to emetine therapy, so much so that radiographic examination at four-day intervals enables one to follow the diminution in the size of the liver.

A history of definite dysentery is not always obtainable. Two forms of bowel looseness are associated with this grave condition: (1) Diarrhoea occurring at night, the bowel acting three or four times; and (2) two or three loose evacuations in the morning between breakfast and midday. Grave difficulty may arise from the scarring which must follow the evacuation of a liver abscess. The scar tissue in the upper abdomen may become herniated and necessitate another operation to repair the breach. Liver abscess may rupture into the lesser peritoneal sac; such instances are rare, but one is recorded where an emergency operation revealed a fluctuating swelling the size of a coconut, which was successfully drained through the lesser omentum. Not every solitary abscess is due to the entamoeba; it may be simulated very closely by a suppurating hydatid cyst, of which two illustrative cases are cited, one of which occurred in a machinist who had never been out of England.

P. H. M-B.

Dew (Harold R.). **Amoebic Abscess of the Liver.** *Med. Jl. Australia.* 1921. Dec. 3. 8th Year. Vol. 2. No. 23. pp. 510–511. With 2 text figs.

Few cases of liver abscess indigenous to Australia have hitherto been recorded.

Two fatal cases are here described, one suspected to be pneumonia, the second provisionally diagnosed as cholelithiasis; in both the primary abscess had burst into a bronchus, and in both death occurred a few days subsequent to operation.

The failure to diagnose liver abscess earlier and the lack of microscopical faeces examination are commented upon.

P. H. M-B.

Hirtzmann (L.). **Histopathologie de l'amibiase hépatique.**—*C.R. Soc. Biol.* 1922. Jan. 21. Vol. 86. No. 3. pp. 127–129.

Sections of a liver in the condition of subacute hepatitis, on the 14th day of an attack of amoebic dysentery, show small ecchymoses ranging from the size of a pea to that of a hazel nut. The cell protoplasm of the hepatic cells had undergone degeneration with karyolysis of the nuclei; no entamoebae were seen. In a liver containing necrotic foci the hepatic cells had lost all recognizable structure, but in the surrounding zone of reaction large mononuclear leucocytes, eosinophile cells and entamoebae could be recognized. A zone of congestion with necrosis of the hepatic cells is also described. The capillary vessels themselves are engorged with red blood corpuscles, and contain entamoebae. Besides this, a zone of irritation and cellular reaction can be recognized in which the cell nuclei are swollen and are undergoing karyolysis. There are other necrotic foci, which are due to the presence of entamoebae with a bacillary infection superadded. Here polymorphonuclear leucocytes predominate.

P. H. M-B.

Hodson (V. S.). [**On Emetine in Liver Abscess.**] (**Correspondence.**)—*Jl. Trop. Med. & Hyg.* 1922. Mar. 1. Vol. 25. No. 5. p. 64.

The author emphasizes his views on the treatment of liver abscess by emetine alone [see this *Bulletin*, Vol. 18, p. 38]. On the reasonable assumption that the amoebae in the liver are killed by the emetine, he can anticipate no more difficulty in the subsequent absorption of the inert abscess than in the absorption, say, of a gumma in the liver. His argument is that the abscess in its active condition is delimited by a defensive zone of hyperaemia. So long as the amoebae are alive, the "flow" from this zone is towards the abscess, but when the amoebae have been killed by the emetine the current as regards the now inert abscess becomes centrifugal, and results in the absorption and extinction of the abscess. He regards the rise of temperature that follows the administration of emetine as an indication of the death of the amoebae and of the turn of the tide that starts the absorption.

A. A.

Ferris. **La dysenterie et l'hépatite suppurée au Dahomey.**—*Ann de Méd. et de Pharm. Colon.* Paris. 1921. Apr.–May–June. Vol. 19. No. 2. pp. 200–202.

From the nature of the cases and from the fact that liver abscess is frequently observed, Ferris is of the opinion that amoebiasis is common in Dahomey. During the early part of 1921, he diagnosed seven cases of hepatic abscess, two in Europeans and five in natives. One case was a native child of 18 months, in whom at operation a collection of pus was found on the anterior border of the liver the size of a large nut. Convalescence was rapid and uneventful.

P. H. M-B.

McDonald (F. R.). **Case Report. Liver Abscess following Amoebic Dysentery.**—*China Med. Jl.* 1921. Sept. Vol. 35. No. 5. p. 453.

A record of unexceptional interest. A Chinese woman suffered from hepatic enlargement subsequent to previous amoebic dysentery. Symptoms subsided under emetine, operation being refused. [No evidence is adduced as to the actual presence of pus in the liver in this case.]

P. H. M.-B.

Rodenhuis (Y.). **Over het bestaan van verschillende rassen van** *Entamoeba histolytica.* [On the Existence of Different Races of *E. histolytica.*]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 6. pp. 655–672. With 3 plates (35 curves).

Dobell and Jepps [this *Bulletin*, Vol. 12, p. 4] concluded from their experiments that there are at least five different races of *Entamoeba histolytica*, distinguishable from each other by the curves representing the dimensions of their cysts.

Rodenhuis thinks that different factors may bring on irregularity of obliquity of the curves :—

1. Faulty technic in measuring the cysts [the original should be seen for details].

2. The amoebae may encyst themselves in different stages of growth, so producing cysts of different measurements. Encystation in the earlier stages might cause a surplus of the smaller cysts in the curve.

3. The conditions of life of the amoebae may be influenced by the surroundings (diet of the host, variations in the intestinal flora and fauna). It is not known with certainty whether an amoebic strain changes its average dimensions if transmitted from a carrier to another person. Some observations of the author on a family of carriers suggest that such a change may occur.

Rodenhuis never found curves that convinced him of the simultaneous occurrence of different races in one patient. He points out that the combinations cited by Dobell and Jepps always concern a "small strain" besides an "ordinary strain," and gives arguments for the attribution of the "small strains" to a different species, *Entamoeba tenuis* (Kuenen and Swellengrebel), which is without pathogenic action in young cats. He concludes that "the existence of different races within the species *Entamoeba histolytica* has not yet been proved."

W. J. Bais.

Fischer (Walther). **Einiges ueber Zysten der** *Entamoeba coli.*—*Cent. f. Bakt.* 1. Abt. Orig. 1921. July 8. Vol. 86. No. 6. pp. 491–494.

Some observations on a chronic case of recurrent painful diarrhoea where "vegetative forms" and afterwards cysts of *Entamoeba coli* were found in the stools. The cysts ranged in size from 16 μ to 22·4 μ. The patient, a woman of 38 years, was successfully operated upon for removal of the appendix, and cysts were not to be found at two examinations of the stools after her recovery. The author leaves the question as to the pathogenic capability of *E. coli* undiscussed, but thinks that the clinical symptoms in this case suggest possibilities.

A. A.

Bacillary Dysentery.

Violle (H.). **Sur une épidémie de dysenterie dans le département de la Seine.**—*Bull. Acad. Méd.* 1921. Dec. 6. Vol. 86. 3rd Ser. No. 40. pp. 321–323.

In the autumn of 1921 numerous cases of dysentery were noted in the suburbs of Paris, especially in the districts of Maisons-Alfort and Alfortville, children and old people being most frequently attacked.

Shiga's bacillus was responsible; the particular strain isolated by Violle was particularly pathogenic for rabbits, whether injected in living or killed cultures. When given subcutaneously the remarkable feature was the manner in which the virus attacked the small intestine, contrary to the usual sequence in man, in whom the large gut is the seat of disease; this fact has hardly attracted the attention it deserves. The microbic flora in the rabbit also becomes completely altered; the dysentery bacillus predominating over all the others. The characteristic pathology of bacillary dysentery in this animal is probably to be ascribed to the anatomical features and fermentative reactions of the alimentary tract.

The original source of infection was believed to be a convalescent depot in the district. It is possible that the dysentery bacillus flourishes and lies dormant during the winter in decomposing manure, which the market gardeners of this region are in the habit of storing in silos. The surface water being contaminated by this means, the epidemic rapidly spreads, being favoured by the disparity between the water levels of the Marne and the Seine. The subsoil water also becomes contaminated by the emptying of privies on to the garden plots. The two districts mentioned are situated at the confluence of the two rivers and are therefore favourably situated for the development of dysentery epidemics.

P. H. M-B.

Bernstein (S.), Kling (D.) & Rosenblatt (S.). **Ueber die Ruhr in Wien (auf Grund der Epidemie im Sommer 1920).**—*Wien. Klin. Woch.* 1921. Nov. 3 & 10. Vol. 34. Nos. 44 & 45. pp. 531–534; 549–551.

The authors studied 901 cases, between the ages of one and 40 years, with a death-rate of 4 per cent.; and 538 cases, from 40 to 80 years, with a death-rate of 24 per cent. Women, on the whole, appear to have been slightly more liable to contract dysentery. The bacteriology of these epidemics has been reported upon by Kirschner and Segall [this *Bulletin*, Vol. 17, p. 175], who isolated Shiga-Kruse bacilli 120 times, pseudo-dysentery 124, Schmitz 12, and *Bacillus faecalis alkaligenes* 6 times. Dysentery must be regarded as a symptom of want and privation, and its spread can only be counteracted by improvement in general nutrition and in hygienic conditions. The clinical features of the Austrian cases did not call for special comment. In the fatal cases intoxication was the main feature; oedema was noted, but could generally be attributed to heart or kidney disease.

Prior to the war, as in the case of the larger Central European cities, dysentery was practically unknown in Vienna. In 1914, 1,279 military cases were notified, but comparatively few cases occurred amongst the civil population—about 200 in 1916. In the summer of 1917 an extensive civil epidemic arose; 2,229 civil cases were notified in that year, 2,316 in 1918, and 3,355 in 1919. In the production of the epidemic several factors, such as numerous foci of infection added to intimate personal contact, are necessary. These conditions were supplied by the return of demobilized soldiers to their homes; in many cases they were either convalescent from dysentery, or were carriers of the infection. The protracted struggle with privation and the hardships it entailed had rendered the population susceptible to infection, and simultaneously dysentery epidemics were reported from

various parts of Germany and Austria where hitherto the disease had been unknown.

Dysentery persisted throughout the winter of 1920, the number of cases averaging about 20 per month. In 14 weeks 1,439 clinical dysenteries were notified, with a death-rate of 12·4 per cent. In the suburb of Oberlan the epidemic could be clearly traced to one fatal [?] case, and owing to lack of adequate sanitation it spread quickly as a house-to-house infection, a mode of infection which could hardly be avoided in the small semi-detached workmen's dwellings. The death-rate in these circumscribed suburban epidemics was an exceptionally high one. In Laa, out of 101 cases, it was 10 per cent.; in Laintz, out of 70 cases, it was 41·4 per cent., the disproportion in the latter instance being possibly accounted for by the greater age and debility of the patients.

Hypochlorhydria with dyspeptic disturbances was observed in a high percentage of cases. Albuminuria was often observed, but a positive diazo-reaction hardly ever. Typhus often occurred as a complication. Coexisting tubercular disease rendered the prognosis grave. Broncho-pneumonia was common in patients over 40. Arthritis, as a rule, ran a benign course, but one exceptional case was noted which lasted for 10 months, and in which X-rays demonstrated extensive joint changes and periosteal swellings.

The sigmoidoscope proved a valuable aid to diagnosis. In slight cases hyperaemia, increased mucoid secretion and haemorrhages were noted, and in the space of two weeks a dry but contused mucosa. In severe cases paresis of the sphincter and a mucosa covered with a diphtheritic membrane and a deep red raspberry-like surface; later still, submucous abscesses discharging pus, and granulations. In the chronic stages, changes in the mucosa to a state resembling ulcerative colitis could be traced.

In the treatment of acute cases these authors consider the effect of antidysenteric serum in doses of 40 to 80 cc. to be limited; the best effects are seen in moderately severe cases. Appendicostomy and partial caecostomy, with subsequent lavage of the large bowel, were not in their experience followed by any good results.

P. H. M-B.

Ornstein (Max). **Zur Bakteriologie des Schmitzbazillus.**—*Ztschr. f. Hyg. u. Infektionskr.* 1920–21. Vol. 91. pp. 152–178.

This paper embodies a careful and exhaustive research into the characters and morphology of Schmitz's bacillus. This organism, Ornstein considers, is a distinct and characteristic species. Non-motile and Gram-negative, it has many cultural features in common with the Shiga-Kruse bacillus, but differs in producing indol and a yellow fluorescence in neutral-red-lactose media. On Endo's medium, its colonies are characteristic, and are larger than those of Shiga's bacillus, the rounded colonies possessing an attenuated, but tessellated, margin. Schmitz's bacillus produces a well-marked and specific antigen. Whether the bacillus possesses the pathogenic properties originally claimed for it still remains to be proved.

The bacillus has to be differentiated from several closely similar species. *Bacillus fallax* can be differentiated by its power of producing acid from saccharose after prolonged incubation, and by its immunity reactions. Another somewhat similar bacillus—*B. inconstans*—may occasionally produce gas in dextrose. The colonies of

the latter two bacilli are easily separable from those of Schmitz on saccharose-fuchsin-sulphite-agar. Schmitz's bacillus, on frequent sub-culture under varying conditions, remains true to type. Agglutination in acid media (MICHAELIS) does not usually take place; *B. fallax* and *inconstans*, however, are strongly clumped under these conditions. A specific serum agglutinating Schmitz's bacillus in high titre can be easily produced, living organisms being more easily clumped than dead cultures. Complement-deviation tests were confirmatory; using *fallax* and *inconstans* as antigens, no fixation of complement was obtained with Schmitz-immune sera.

Attempts to isolate a virus toxic to rabbits from Schmitz's bacillus failed.

P. H. M-B.

i. BLUMENTHAL (G.). **Zur Aetiologie der bazillären Ruhr.**—*Ztschr. f. Hyg. u. Infektionskr.* 1920–21. Vol. 91. pp. 335–352.

ii. SCHMITZ (K. E. F.). **Bemerkungen zu der Arbeit von G. Blumenthal: "Zur Ätiologie der bazillären Ruhr." Diese Zeitschr. Bd. 91. S. 335.**—*Ibid.* 1921. Vol. 92. pp. 516–517.

i. Several strains of dysentery bacilli differing from the type organisms in their serological reactions were isolated. Heat-killed cultures were agglutinated solely by homologous sera.

The etiological importance of these serological types is uncertain; but the fact that they are agglutinated by the patient's sera would seem to be suggestive. Agglutination experiments indicated that SCHMITZ's bacillus corresponds to the type J of KRUSE.

The author contends that the Flexner-Y sera usually employed are useless for bacteriological diagnosis. For this purpose a multivalent serum containing agglutinins for Kruse types A, D, and H, as well as a univalent serum specific for type E, are, he considers, necessary.

ii. The fact that Shiga's bacillus is agglutinated by serums of Schmitz-dysentery cases, the author writes, need not necessarily invalidate the Schmitz-bacillus as the cause of the disease.

Schmitz maintains that he took every possible care to isolate Shiga's bacillus from his series of cases, but failed to do so. On the other hand, Schmitz's bacillus was present in practically a pure culture. Why, he argues, if it is not the cause of the dysentery, is Schmitz's bacillus agglutinated to such a high titre by the serums of the patients? He considers that dysentery caused by the Schmitz-bacillus is more widespread than was formerly believed.

P. H. M-B.

KNORR (Maximilian). **Experimentelle Studien ueber die Wirkung von Rindergalle auf Ruhrbazillen.** [Study on the Action of Ox Gall on Dysentery Bacilli.]—*Cent. f. Bakt.* 1. Abt. Orig. 1921. Dec. 17. Vol. 87. No. 5. pp. 339–345.

Bile exerts a certain deleterious effect upon Shiga-Kruse bacilli, more damaging to some strains than to others. These dysentery bacilli may circulate in the blood in the earlier stages of the illness, and, taking this into consideration, and especially the tendency of bile to kill off the bacilli in small numbers, it is not surprising that the chances of recovering dysentery organisms in bile media from the blood are small. On pseudo-dysentery bacilli the effect is the same, but upon the so-called Y strain it has no deleterious action. These experiments suggest the use of bile in Shiga-dysentery as a therapeutic agent.

P. H. M-B.

Mita (K.). **Dysentery-like Diseases (Paradysentery, Paratyphoid) in Children and their Causes.** — *Jl. Infect. Dis.* 1921. Dec. Vol. 29. No. 6. pp. 580–590. With 1 plate.

Various types of bacilli may be the cause of dysentery in children. While the classical types of dysentery bacilli can be isolated, not infrequently other kinds of dysentery bacilli are present as well. Mita is of the opinion that at least one quarter of the cases are traceable to organisms not of the true dysentery type. Paradysentery bacilli are small, non-motile rods. After prolonged incubation, milk is coagulated by them; round and irregular colonies are produced; in some instances the organisms show marked bipolarity when stained by Ziehl's stain. Dysenteric symptoms may also be produced by a paratyphoid organism forming acid and gas in mannite and dextrose, but not affecting saccharose, maltose, dextrose and lactose. This organism he proposes to call "Paratyphoid X."

P. H. M-B.

Minoda (Mitsugu). [**On the Etiology and Pathology of Infantile Dysentery-like Diseases.**]—*Fukuoka Ikadaigaku Zasshi* (*Arch. of the Fukuoka Med. College*). 1921. Apr. Vol. 14. No. 1. [Summarised in *Japan Med. World*. Tokyo. Aug. 15. Vol. 1. No. 4. p. 22.]

The dysentery bacillus was isolated from 334 cases, but from 70 others bacteria other than of dysentery were obtained. Of common occurrence were two bacilli, named paradysentery bacilli A and B. The behaviour of the bacillus towards the serum of the patient, and its morphology and cultural reactions, were studied. The specific pathological feature was a diphtheroid inflammation, but never so intense as that caused by the true dysentery bacillus. From the results of the author's observations over four years, from 1916 to 1919, he finds that the ratio of infection with paradysentery bacilli to that caused by true dysentery bacilli is 1 : 3.

P. H. M-B.

Tawara (Shugo). [**Researches on the Strain of Dysentery Bacillus isolated from Infantile Dysentery, including "Ekiri."**]—*Jika Zasshi* (*Jl. Jap. Soc. of Pediatrics*). 1921. Feb. No. 249. [Summarized in *Japan Med. World*. Tokyo. 1921. June 20. Vol. 1. No. 2. p. 18.]

A study based on "ekiri," or suspected cases of dysentery, during the last 7 years.

The total number of cases was 450, of which 196, or 47·5 per cent., belong to the so-called third type of dysentery bacillus, 187, or 41·5 per cent., to the first type, 25, or 5·5 per cent., to *Bacillus pseudodysenteriae*. Only 5 cases, or 1·1 per cent., were caused by the Shiga dysentery bacillus. Investigations are being directed to the point whether certain types, as well as pseudodysentery bacilli, are independent species or only metamorphosed forms. In certain cases in children of 2–6 years the bacillary toxins affect the brain; prognosis then is bad. Almost all the cases of so-called "ekiri" are examples of infantile dysentery.

P. H. M-B.

TSUCHIHASHI (Kotaro). [**A Study on the Leucocytes in Infantile Dysentery and Para-Dysentery.**]—*Jika Zasshi (Jl. Jap. Soc. of Pediatrics).* 1921. June. No. 253. [Summarized in *Japan Med. World.* Tokyo. 1921. Oct. 15. Vol. 1. No. 6. pp. 17–18.]

A detailed blood examination was made in 41 cases of infantile dysentery and para-dysentery. No difference in the features of the leucocytes was discernible; in both a leucopenia is present; the polymorphs are increased at the height of the disease, but decrease during convalescence; the lymphocytes are proportionately increased and vary inversely as the polymorphs. The eosinophiles decrease in numbers in the initial stages and in severe and fatal cases eventually disappear.

P. H. M-B.

v. FRIEDRICH (Ladislaus). **Zur Frage der Pankreasfunktion bei der Ruhr.**—*Muench. Med. Woch.* 1922. Mar. 10. Vol. 69. No. 10. pp. 344–347.

The duodenal secretions in 20 cases were removed by means of a duodenal sound and examined for trypsin and diastase. In the acute stage of bacillary dysentery there appears to be an achylia and a definite alteration in the character of the pancreatic secretion. In the chronic stages the achylia persists and the pancreatic secretions are diminished, but not altered in chemical composition. The author believes that the incompleteness of digestion, as evidenced by the abundance of food remains in dysenteric dejecta, is to be ascribed to interference with the digestive and absorptive functions of the small intestine.

P. H. M-B.

LEAGUE OF NATIONS. **International Conference on the Standardisation of Sera and Serological Tests, convened by the Health Committee of the League of Nations and held on December 12th to 14th, 1921, at the British Ministry of Health, London.—Société des Nations. Conférence Internationale de la Standardisation des Sérums et des réactions sérologiques convoquée par le Comité d'Hygiène de la Société des Nations et tenue du 12 au 14 décembre, 1921, au Ministère de l'Hygiène, Londres.**—18 pp. 1921. Dec. 30. Genève.

The resolutions adopted by the Sub-Committee on Dysentery Serum were to the following effect :—

It was agreed to be advisable for different institutes, laboratories, etc., to exchange samples of serum and toxin, and that further experiments should be carried out, using different methods of titration and different species of animals.

In testing the potency of sera there was a general agreement that the anti-toxin, especially the anti-endotoxin, should be estimated; it could be carried out equally well with dead bacilli as with toxin. It was recommended that a series of tests should be carried out on mice, rabbits and guinea-pigs with the standard serum which the Frankfort Institute would supply, comparing them with the methods in use in the various institutes; it is advisable to test the anti-microbic power of a serum by employing living bacilli for the purpose. It is not necessary to inoculate horses with several strains of B. Shiga-Kruse in order to produce experimental anti-sera. It was agreed

that the question of preparation and the standardization of polyvalent sera prepared from various other atoxic dysentery bacilli should not be discussed, in view of the actual state of knowledge on this subject.

P. H. M-B.

Josephs (Hugh W.) & Davison (Wilburt C.). **The Sero-Therapy of Bacillary Dysentery in Children.**— *Jl. Amer. Med. Assoc.* 1921. Dec. 10. Vol. 77. No. 24. pp. 1863–1864.

Encouraged by enthusiastic reports in favour of specific serum therapy in both Flexner and Shiga dysentery during the last two years, the authors administered antidysenteric serum to 20 children, aged from 6 months to 4½ years, who were suffering from dysentery —polyvalent serum, in doses from 20–50 cc., being injected intravenously or subcutaneously. In some instances as many as six doses, at intervals of from 24 to 48 hours, were given. In two cases of Shiga infection Rockefeller Institute Shiga dysentery antitoxin, in doses of 20 cc., was employed. During 1919 and 1920, 73 cases in children were studied, in all of which the clinical diagnosis was confirmed by the recovery of dysentery bacillus from the stools or post-mortem.

Subcutaneous or intramuscular injection of this serum is harmless; no symptoms of anaphylaxis were noted. Subsequent reactions were slight; serum sickness, a rise of temperature or urticaria bore no relation to the ultimate outcome. A table shows the results of cases treated and untreated by serum, divided, as accurately as possible, into severe, moderate and mild groups. The mortality in the untreated and treated severe cases was practically identical (78 and 77 per cent. respectively). On the whole the mortality amongst the treated cases was greater (50 per cent.) than amongst the 53 untreated cases (28 per cent.). The authors do not believe that serum actually increased the mortality, but it is probable that the treated group contained more severe infections. Further statistical tables indicate that serum administered during the first few days of the disease is more beneficial than when injected during the second week. It is clear that serum has no effect in prolonging life in severe cases, nor has it any effect upon the number and character of the stools. In the very ill, especially in infants, the pain at the site of injection is a contra indication to the use of intramuscular injections.

P. H. M-B.

Jezierski (W.) & Wierzbicki (B.). [**Traitement de la dysenterie par les antigènes.**]—*Nouvelles Méd.* Poznan. 1921. 1st Part. Vol. 33. Nos. 1–5. [Summarized in *Bull. Inst. Pasteur.* 1922. Feb. 15. Vol. 20. No. 3. p. 118.]

Dysenteric antigens (vaccines) were employed in 27 cases of bacillary dysentery, in almost every instance with success. There was only one fatality, in an old woman of 70. The antigens were given by a novel method, in enemata. An ampoule of the vaccine was diluted with 150–200 cc. of water and introduced drop by drop into the intestine by means of a rubber tube 25–30 cm. in length. The treatment lasted 2–8 hours in each instance and was spread over a period of eight days.

P. H. M-B.

Besson & de Lavergne. **De la différenciation des bacilles de Flexner et de Hiss récemment isolés de l'organisme, par le sérum de cheval agglutinant le bacille de Shiga.**—*C. R. Soc. Biol.* 1922. Feb. 11. Vol. 86. No. 6. pp. 323–324.

It is generally admitted that the bacilli of Flexner and of Hiss can be distinguished by one characteristic only, the fermentation of maltose. The ability of the Flexner bacillus to ferment this substance is lost by frequent subculture; on the other hand, certain strains of Hiss's bacillus actively acquire this property on subculture. The table of serum reactions set out by the authors shows that Hiss bacilli recently isolated from stools are not agglutinated in lower dilutions by anti-Shiga serums, whereas old subcultures of Flexner bacilli certainly are.

P. H. M-B.

Dold (Hermann) & Chen Yühsiang. **Ueber die Lebensdauer einiger pathogener Bakterien (Typhusbazillen, Paratyphusbazillen, Dysenteriebazillen, Choleravibrionen, Diphtheriebazillen) auf Papiergeld.** [The Life of Pathogenic Organisms on Paper Money.]—*Arch. f. Hyg.* 1920. Vol. 89. Nos. 1, 2 and 3. pp. 63–70.

Previous investigators have busied themselves with studying the possible spread of disease by means of pathogenic organisms upon metal coins. The result of these investigations has been that aerogenous micrococci and fungi were the species most commonly found. *Bacillus coli*, in spite of its wide distribution in nature, does not long remain viable on metal pieces. The question of the disease-carrying possibilities of paper money has so far received no attention. The organisms investigated in this enquiry were *B. typhosus*, *B. paratyphosus* B, dysentery, cholera, and diphtheria bacilli.

Fresh Chinese bank notes were used; they were first cut into pieces 1 cm. square, sterilized in damp heat and then dried; subsequently they were covered by a thin emulsion of the organism under investigation. The infected pieces were kept in large Petri dishes at room temperature screened from direct sunlight. From time to time such a piece was removed and tested for living organisms. The following results were obtained:—

Viability on Paper Money.

	Minimum.	Maximum.
Typhoid bacilli (stock culture)	12 hrs.	36 hrs.
,, ,, in typhoid stool	72 ,,	120 ,,
Paratyphoid B (stock culture)	48 ,,	132 ,,
Dysentery, Shiga-Kruse bacillus (stock culture) ..	2 ,,	24 ,,
Cholera vibrio (stock culture)	10 mins.	1 ,,
Diphtheria bacillus (stock culture)	19 hrs.	24 ,,
,, ,, (fresh culture)	96 ,,	120 ,,

The conclusion reached is that the possibility of the conveyance of the main disease-producing germs through the handling of paper money cannot be disregarded. The fact that typhoid bacilli can be recovered and are viable for a much longer period in faeces than in artificial cultures would seem to indicate that in a natural organic substratum they are capable of being spread more widely by this means. Old notes constitute a much more favourable medium for growth and retention of these organisms than do those of recent issue.

P. H. M-B.

Zoller (H. F.) & Clark (W. M.). [**The Production of Volatile Fatty Acids by Bacteria of the Dysentery Group.**]— *Jl. Gen. Physiol.* 1921. Vol. 3. No. 3. pp. 325–330. With 1 fig. [Summarized in *Experiment Station Record.* Washington. 1921. Sept. Vol. 45. No. 4. p. 311.]

A close agreement exists among all the organisms of the dysentery group studied, in the total quantity of volatile fatty acids produced, and in the ratio of formic to acetic acids under aerobic conditions and in the presence of 1 per cent. glucose. When grown upon peptone alone, with free access of air to the cultures, volatile fatty acids are produced in appreciable quantities, although the reaction of the solution has become more alkaline when tested by colorimetric pH tests. Upon exhaustion of air from the sugar-free medium the bacteria again produce formic and some butyric acids. The presence of glucose in the medium from which air has been pumped furnishes a condition which provokes the same type and degree of fermentation that operates in the glucose medium bathed in air at atmospheric pressure. The large quantity of formic acid produced by these bacteria may play a significant part in the digestive disturbances and toxic symptoms accompanying their infection of the human intestinal tract.

P. H. M-B.

Kendall (Arthur Isaac) & Haner (Reba Cordelia). **The Nitrogenous Metabolism of** *B. dysenteriae* **(Shiga),** *Bacillus typhosus, B. paratyphosus* **alpha and** *B. paratyphosus* **beta. Studies in Bacterial Metabolism. LVIII–LXI.**— *Jl. Infect. Dis.* 1922. Feb. Vol. 30 No. 2. pp. 225–238.

Shiga's bacillus differs from other members of the dysentery group in producing the same amount of ammonia in plain and glucose broths during the earlier days of incubation. Although one of the more inert bacteria, chemically speaking, the changes produced by it in the nitrogenous constituents of the media are perfectly clear. In gelatin media the Shiga bacillus finds the best pabulum in the residual non-protein portion.

P. H. M-B.

Kendall (Arthur Isaac), Haner (Reba Cordelia) & Bly (Robert S.). **The Nitrogenous Metabolism of the Schmitz Bacillus. Studies in Bacterial Metabolism. LXIII.**— *Jl. Infect. Dis.* 1922. Feb. Vol. 30. No. 2. pp. 245–247.

Cultural differences between the Shiga bacillus and the Schmitz bacillus are at once discernible. Shiga's bacillus produces a moderate increase in reaction up to and including the first week of growth, during which time the amount of ammonia formation is minimal and the evidence points to a non-nitrogenous source of energy during that period. Then the reaction becomes alkaline and deamination (ammonia formation) commences. This was explained on the supposition that Shiga's bacillus has a predilection for the carbohydrate fraction of the protein molecule which is not utilized by the Schmitz bacillus. In respect of indol formation Schmitz's bacillus more nearly resembles the Flexner than the Shiga type of bacillus. On the other hand, the inability of the Schmitz bacillus to ferment mannite separates it sharply from the Flexner type.

P. H. M-B.

GARDNER (A. D.). **The Normal Limit of Agglutination for *B. dysenteriae* (Flexner) and the Sensitiveness of Suspensions.**—*Lancet.* 1921. Dec. 17. pp. 1269–1271.

Experiments were made with the same antigen as that used by DAWSON and MOODIE (see this *Bulletin*, Vol. 19, p. 39). Professor DUDGEON's antigen (Flexner-Gallipoli) proved to be a suspension of great sensitiveness and at the same time betrayed no tendency to spontaneous flocculation as compared with suspensions of standard cultures issued from Oxford. Flexner-Gallipoli (Dudgeon) is serologically, in other respects, identical with the Flexner (V) strain used in making the standard emulsions. Just as specific serums give a much higher titre with Flexner-Gallipoli suspensions than with Oxford standard cultures, so do normal serums. Owing to the presence of Flexner agglutinins in normal serums, highly sensitive suspensions are, for the purposes of clinical diagnosis, of no greater value than those which are less sensitive. The limit of normal agglutination of a suspension, or set of suspensions, must be determined before they can be employed in serodiagnosis. Standard suspensions and standard technique are essential for this work.

P. H. M-B.

VINCENT (H.). **Sur la vaccination de l'homme contre la dysenterie bacillaire.**—*C.R. Soc. Biol.* 1921. Nov. 26. Vol. 85. No. 34. pp. 965–967.

No fewer than 2,175 persons have been inoculated against bacillary dysentery with a polyvalent antidysenteric vaccine. The dose contains 500–750 million bacilli, and it is claimed that epidemics of Shiga dysentery have been thereby curtailed. Immunization is not immediately effected, for it takes 5 or 6 days for antibodies to appear in the blood. Amongst the 2,175 inoculated, 33 cases of dysentery appeared 4 days later. The morbidity rate worked out at 16 per 1,000 amongst the inoculated and 228 per 1,000 amongst the uninoculated. A new series has recently been completed, using a polyvalent vaccine (prepared with 8 races of Shiga, 5 of Flexner, 1 Strong and 3 Hiss); 200 millions were given at a dose. Amongst the uninoculated the case incidence was 70·57 and the mortality rate 1·56 per 1,000; amongst the inoculated the incidence was 8·14 per 1,000 and the mortality nil.

P. H. M-B.

CSERNEL (Eugen). **Beitrag zur Schutzimpfung gegen Dysenterie mittels Serovakzine.** [Preventive Inoculation against Dysentery by Sero-Vaccine.]—*Ztschr. f. Hyg. u. Infektionskr.* 1920–21. Vol. 91. pp. 53–56.

During the summer of 1917 circumscribed dysentery epidemics broke out in Austria in circumstances favourable for testing the value of preventive inoculation. The vaccine was made from agar cultures of Shiga-Kruse and Flexner-Y bacilli in 6 per cent. saline; the resulting emulsion was counted and a mixture made containing, as far as possible, equal parts of virulent and avirulent organisms. Efforts were made to neutralize the toxicity of the vaccine by the addition of 0·4 cc. antitoxic dysentery serum to each 500 million organisms. The first inoculation consisted of 1 cc., followed eight days later by a second containing the organisms without the admixture of serum. The results

obtained in a circumscribed epidemic amongst quarry labourers are given as follows :—

Of those uninoculated 10 per cent. became ill, but after inoculation commenced only an additional seven cases were reported (0·9 per cent.) and the epidemic came to an end, though it continued to simmer in the neighbouring villages.

P. H. M-B.

KANAI (S.). **Dysentery Immunisation in Rabbits by the Oral and Subcutaneous Methods.**—*Brit. Jl. Experim. Path.* 1921. Dec. Vol. 2. No. 6. pp. 256–265.

In appraising the practical value of any method of prophylactic immunization the following points should be considered :—

(1) The degree of immunity obtained ; (2) the intensity of reaction, local and general, produced by the vaccine ; (3) the simplicity of administration.

In view of the reaction which may follow subcutaneous inoculation of Shiga vaccines, and in view of BESREDKA's work on immunization produced by oral administration, Kanai compared various methods of immunization. The 24-hour growth on agar from one Roux bottle was suspended in 20 cc. of sterile normal saline, heated for one hour at 60° C., and measured quantities were mixed with bran and fed to fasting rabbits. Antibody production was determined by means of agglutination tests and the immunity response by intravenous inoculation of living and virulent *B. dysenteriae*. The result of experiments planned on these lines tended to show that a certain degree of immunity to *B. dysenteriae* (Shiga) can be produced in rabbits by the oral administration of vaccines, though the experiment as a whole cannot be regarded as completely satisfactory owing to complicating coccidiosis infection. Ingestion of killed bacilli resulted in the appearance of agglutinins in the serum. Ingestion of even enormous quantities of vaccine had no effect upon the general health of the animal. A greater degree of immunity was obtained by subcutaneous inoculation of carbolized vaccine. The ingestion of bile does not increase the efficacy of oral immunization. In a later series of experiments the vaccine was introduced into the stomach of the rabbit by means of a cannula. In neither instance did any solid immunity result.

P. H. M-B.

SCHULTZ-BASCHO (Paula). **Zur Klinik der Bazillenruhr im Kindesalter.**—*Arch. f. Kinderheilkunde.* Stuttgart. 1921. Apr. 16. Vol. 69. No. 3–4. pp. 269–279.

A discursive paper with no new or interesting information.

P. H. M-B.

MIXED AND UNCLASSED DYSENTERY.

GOÈRÉ (R.). **Les maladies endémo-epidémiques dans le personnel de la marine à Saïgon pendant l'année 1920 ; quelques aperçus sur la pathologie Saïgonnaise et les traitements nouveaux des maladies tropicales.**—*Arch. Méd. et Pharm. Nav.* 1921. Nov.–Dec. Vol. 111. No. 6. pp. 495–509.

Amoebiasis accounts for a considerable proportion of cases in Saigon, especially in the months from April to August. Emetine hydrochloride appears to be as efficacious as elsewhere.

Natives possess a considerably greater immunity against the infection than do Europeans; this was specially noticeable in Annamite and Tonkinese sailors. In amoebic and presuppurative hepatitis intravenous injections of emetine are advocated. Should surgical intervention become necessary, it must be accompanied by emetine therapy.

Amoebic dysentery may be aggravated, or dysenteric symptoms may even be caused, by intestinal helminths, such as Ascaris and Trichocephalus.

In bacillary dysentery injection of antidysenteric serum in large doses is indicated, but serum-sickness is a common sequel in Saigon, and therefore this line of treatment has its drawbacks which are not entirely discounted by previous desensitization by injections of small quantities of serum.

"Diarrhée chronique de Cochinchine," usually known as sprue and also under the soubriquet "Cochinchinette," is becoming rarer, for the reason (so the author avers) that better hygienic conditions of the gut oppose themselves to the development of lactose-fermenting bacilli and yeasts.

P. H. M-B.

Kling (D.). **Zur Kohlebehandlung der Ruhr.** [Charcoal Treatment of Dysentery.]—*Med. Klin.* 1922. Jan. 8. Vol. 18. No. 2. pp. 46–48.

In 1914 Singer recommended charcoal in the treatment of dysentery, given as an ingredient of a bolus or as an enema. Experience gained in the treatment of over 3,000 cases of dysentery has led the author to doubt the value of this method. One of his patients, apparently convalescent, died suddenly from perforation, and this untoward event he ascribes to the balling of charcoal in the large gut. Two similar fatal cases are cited as having occurred in the practice of his colleagues. In one instance he found that the charcoal was retained for seven days. The charcoal was given in powder form—3 teaspoonfuls daily—well suspended in half a wineglassful of water.

Many experiments have been made on animals with the object of proving that charcoal is capable of absorbing various organic and inorganic poisons when given *per os* and thus rendering them inoperative, but Kruse has shown that this substance has no action upon living dysentery bacilli. The author is of the opinion that the use of charcoal in bacillary dysentery is contraindicated for the reasons already stated and for its possible mechanical action in preventing the healing of the lacerated mucosa.

P. H. M-B.

Werlé (Wilhelm). **Beitrag zur Therapie postdysenterischer Darmstörungen.** [Treatment of Post-Dysenteric Intestinal Symptoms.] —*Muench. Med. Woch.* 1921. Dec. 9. Vol. 68. No. 49. pp. 1581–1582.

A record of no exceptional interest. The patient, a sanitary section officer from Macedonia, contracted a pyrexial attack of dysentery in 1918. Post-dysenteric diarrhoea supervened and persisted for four months after his return to Germany; tannin acid, tannalbin and silver nitrate injections, all failed to cure. With a preparation called "Mutaflor" (composition not stated) improvement rapidly set in and the patient recovered in 2–3 weeks.

P. H. M-B.

Buttenwieser. **Azetonurie und experimentelle Adrenalinglykämie bei Ruhr.** [Acetonuria and Experimental Adrenalin Glycaemia in Dysentery.]—*Muench. Med. Woch.* 1922. Jan. 20. Vol. 69. No. 3. p. 83.

As acetone bodies rapidly appear in the urine during starvation, therefore it was not surprising that acetonuria occurred in five out of seven dysentery patients. After the injection of adrenalin in these patients a hyperglycaemia was noted which became more pronounced after administration of 100 gm. of dextrose.

P. H. M-B.

Levy (Moise D.). **The Treatment of** *Trichomonas intestinalis* **Infections.**—*Amer. Jl. Trop. Med.* 1922. Jan. Vol. 2. No. 1. pp. 71–75.

The author has found 20 per cent. of cases examined infected with *Trichomonas intestinalis*; all give a history of occasional diarrheal attacks and, in several instances, mucus and some blood were present in the evacuations. Using previous observations as a working hypothesis, and bearing in mind Haughwout's views regarding the chemical changes in the cells and body fluids of the host, a plan of treatment was formulated. The usual preliminary saline purge and liquid diet having been given, calomel gr. 1/10 was ordered every 20 minutes until ten doses had been taken; this dosage is repeated daily for four days each week for four weeks. Dried ox-bile gr. 5–25 in capsule is given three times a day in addition to dil. HCl ℥ 20–40 daily for a month. Should a stool examination at the end of this time show Trichomonads still present, the treatment is repeated.

P. H. M-B.

McGill (Caroline). **Giardiasis.**—*Jl. Amer. Med. Assoc.* 1922. Jan. 21. Vol. 78. No. 3. pp. 179–180.

The following conclusions are reached, based admittedly on very little evidence:—

Giardiasis is a frequent cause of severe diarrhoea with impairment of general health, though there may be constipation. Practically all the patients suffer from abdominal pain, which may be severe. The parasite may invade the gall-bladder, and when present also in the duodenum may give rise to symptoms resembling those of duodenal ulcer. No treatment yet suggested has been successful, though neoarsphenamin injections (0·3–0·6 gm.), together with benzyl-benzoate, alleviate the symptoms.

P. H. M-B.

i. Pedley (Frank G.). **A Case of Giardiasis (Lambliasis) intestinalis.**—*Canadian Med. Assoc. Jl.* 1921. Nov. Vol. 11. No. 11. pp. 829–830.

ii. Yakimoff (W. L.) & Solowzoff (A. S.). **Un cas de lambliose guéri par le "Luargol."**—*Bull. Soc. Path. Exot.* 1921. Dec. 14. Vol. 14. No. 10. pp. 652–653.

i. Records a case of Giardia infection in a French-Canadian boy, aged 5, who had never been out of Canada.

ii. The authors claim on extremely scanty evidence to have cured a soldier of lambliasis, which was causing vomiting and various intestinal symptoms, by means of intravenous injections of 0·15 gm. of Luargol. The parasites, it is said, immediately disappeared.

P. H. M-B.

BLACKWATER FEVER.

i. Crichlow (Nathaniel). **Blackwater Fever in the Solomon Islands.** —*Jl. Trop. Med. & Hyg.* 1921. Sept. 1. Vol. 24. No. 17. pp. 231–234. With 1 chart in text.

ii. ——. **Further Cases of Blackwater Fever in the British Solomon Islands.**— *Ibid.* Oct. 1. No. 19. pp. 255–257. With 1 text fig.

i. Until recently blackwater fever was unknown in the British Solomon Islands, but of late it has been comparatively common. In a table are given (1) the total number of deaths in the Protectorate, and (2) the number of deaths from blackwater fever. The following factors operated to bring this about.

1. The increase of the European population.
2. The injudicious use of quinine.
3. Repeated attacks of malaria and incomplete treatment.

The author firmly believes that blackwater fever is a disease introduced into the British Solomon Islands. In support of his view that blackwater is caused by some unknown agency, the author states that the disease has occurred in persons without a previous attack of malaria and that new residents are attacked. The length of residence of the cases occurring during 1920 were :—one case 5 months, one 9 months, one 18 months, two 2 years, one 5 years, two 6 years and one 10 years. Malaria and quinine are only predisposing causes, as also are chills, exhaustion and alcoholism.

The paper concludes with an account of the symptoms and treatment.

ii. In this paper the author brings forward further evidence to support his view that blackwater fever was introduced into the British Solomon Islands. It is as follows :—

In speaking with " an old stager " here, he said that blackwater fever was unknown in the British Solomon Islands until a certain gentleman some years ago died from the disease. This gentleman had the disease previously in West Africa. This was the first known case of blackwater fever in the British Solomon Islands.

Could not the disease have been introduced by him and others who had the disease previously in other tropical countries ?

It will thus appear that blackwater fever is an importation from West Africa. [Comment is needless.]

Warrington Yorke.

Wiggins (C. A.). **Report on Blackwater Fever in Uganda for 1920.**— *Uganda Protectorate Ann. Med. & San. Rep. for the Year ended 31st December, 1920.* pp. 43–47.

The number of cases of the disease in 1920 was 56 with seven deaths. Twenty-one of these cases are reported to have had previous attacks.

European.—One had 3 previous attacks ; three had 1 previous attack (one death).

Asiatics.—One had 4 previous attacks ; one had 3 previous attacks ; three had 2 previous attacks ; twelve had 1 previous attack.

Blood examinations were made in all cases, but malarial parasites were found in eight only—in three cases before the attack, in five during the attack.

The summary is as follows :—

" From the above and from a careful perusal of the individual reports the following are some of the conclusions arrived at :—

" 1. *Decreased Case and Death Rates.* I hope that these to some extent may be due to permanent factors such as the general anti-malarial measures in progress, the better acquaintance with the disease and with the necessity for greater individual precautions against malaria and of early and adequate treatment.

" 2. *Exciting and Predisposing Causes and Quinine Habits.* In my opinion there appears to be overwhelming evidence for the following conclusions from the reports received.

" (*a*) That without malaria there would have been no case of blackwater fever.

" (*b*) That the previous attacks of malaria had usually been numerous and in all cases inadequately treated.

"(*c*) That in all cases, except possibly one, the previous administration of quinine can be said with confidence to have nothing to do with the bringing on of the haemoglobinuria. On the other hand cases of blackwater fever occurred when no quinine had been taken for several days, weeks or months, and, in one case, not at all previous to the haemoglobinuria. In the one doubtful case referred to above the patient had been suffering from fever for a week without taking any quinine, then took 30 grains in one day in three doses and developed haemoglobinuria shortly after the third dose.

" 3. One of the patients who died had taken regularly five grains of quinine daily as a prophylactic for one year previously. It is also recorded that he had had very numerous attacks of malaria which were inadequately self-treated by increased doses of quinine. Four other patients also took quinine regularly as a prophylactic ; three of these had the same history of numerous mild and self-treated attacks of fever. This in my experience is not an unusual history in cases of blackwater fever and illustrates one of the objections to indiscriminate quinine prophylaxis in a country where this disease is prevalent. I have no doubt that the prophylactic prevents small malarial infections in many cases, but not large or numerous infections. Mild attacks of fever difficult to diagnose as malaria begin to occur which are only damped down by increased doses of quinine for a few days, and eventually after some additional exciting cause, such as a chill, or over exertion, blackwater fever supervenes. Possibly if the prophylactic quinine had not been taken the first attack of malaria would have been more severe, medical aid called in, and the case adequately treated. Such cases are, of course, more apt to occur in persons isolated from early medical treatment, and in this Protectorate with the ever-present danger of blackwater fever looming ahead, I cannot feel justified in recommending in every case the constant use of quinine as a prophylactic unless under medical supervision. I am convinced that the usual custom is for the average layman to take far too much quinine as a prophylactic and not nearly enough during and after an attack of malaria : a system which invites attacks of blackwater fever.

" 4. The fact that 21 of the total cases had previously suffered from one or more attacks of blackwater fever confirms the conclusion that one attack of this disease predisposes rather than otherwise to further attacks."

W. Y.

Pons. **Etude de la fièvre bilieuse hémoglobinurique dans ses rapports avec le paludisme.**— *Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Apr.–May–June. Vol. 19. No. 2. pp. 147–166. With 1 text fig.

In this work, based on a study of 52 cases, the author has attempted to ascertain the relationship between malaria and blackwater fever. The observations were made in Tonkin and Laos.

As a result of examining the distribution of malaria and blackwater in those vast regions, the author concludes that in those places where malaria manifests itself in a severe form blackwater fever occurs, and conversely in places where blackwater is found the malaria is of a severe type.

In a table the various races and tribes are classified, and their sensibility to malaria and blackwater recorded. From this it appears that only the autochthonous inhabitants of malarial zones, infected in their infancy, and inheriting slight immunity, and in whom the malarial manifestations become milder after early childhood, are very resistant to blackwater fever. The inhabitants that have been implanted for a long time in the valley and have fused with the aborigines, exhibit a less marked resistance to malaria and backwater. The tribes living on the hills and those recently installed in the valleys (Occidentals, Chinese and Annamites) suffer most severely from the two diseases.

Blackwater fever does not occur regularly all the year round ; it is an aestivo-autumnal affection. In the third military territory not a single case was observed during the first six months of 1914 ; its appearance coincided with that of the rains, that is, with the malarial period. During the second half of the year, out of 850 men, of which 665 were stationed in the low valleys, 21 developed blackwater fever. On the upper Noire River 38 cases occurred out of 315 men between the period 1 January, 1915, and 28 February, 1916. The monthly incidence of the cases was as follows :—June 9, July 6, August 8, September 2, October 2, November 3, December 4, January 3, February 1. It is noted that the troops were engaged in police operations from November to February. Twenty-three cases are analysed regarding their sojourn in the country before developing blackwater fever ; the information is set out in the following table :—

Sojourn.	Number of Cases.
0–6 months	0
6 months–1 year	2*
1–2 years	3
2–3 ,, ...	10
3–4 ,, ...	6
5–6 ,, ...	2

The decrease in the numbers of cases after three years is due to the fact that the normal tour is 36 months, and consequently only few remained longer.

Discussing the part played by quinine in the production of blackwater, Pons states that each trooper received daily a dose of quinine varying from 0·3 to 0·5 gm., and that all his cases occurred amongst men taking quinine in these doses ; he remarks, however, that the attack usually followed a malarial paroxysm, when the dose of quinine was increased to 0·75 or 1·0 gm. The author does not believe that there is such a condition as quinine haemoglobinuria as distinct from blackwater fever. He points out that during the influenza epidemic quinine was a very favourite drug and yet no instance of haemoglobinuria is recorded as a result of this wholesale drugging with the alkaloid. The haemoglobinuria following quinine is veritable blackwater fever ; the organism being "en instance d'hémolyse," the

* These two cases had made previous tours in the country.

alkaloid determines a crisis by putting into play a hyperactivity of the haemolytic functions of the liver and spleen. Apparently cold exerted no influence in precipitating blackwater.

Details of a number of cases are given showing :—

1. Haemoglobinuria following a series of quotidian attacks.
2. Haemoglobinuria following a series of attacks of septan type ; the patient had malarial attacks on the 2nd ; 13th, 14th, 15th ; 21st, 22nd and 23rd ; and on the 29th he developed blackwater fever.
3. Haemoglobinuria following an attack of tertian malaria.
4. Haemoglobinuria without any preceding malarial paroxysm. This type was much less common than the others.

Repeated attacks in the same individual are not uncommon ; far from confirming a degree of immunity, one attack predisposes to a second. Of 24 cases in which it was possible to obtain definite information, the attack observed by Pons was in one case the seventh, in one the sixth, in one the third, and in six the second.

In conclusion, the author believes that the observations recorded in this paper support the malarial theory of blackwater fever. He is of opinion that blackwater fever occurs in patients suffering from true visceral malaria and that the site of the infection is the liver and spleen.

W. Y.

DE LA POUGE. **Observations concernant des cas de fièvre bilieuse hémoglobinurique.**—*Rev. Méd. et Hyg. Trop.* 1921. Vol. 13. No. 3. pp. 82–91. (Discussion, pp. 91–92.)

Clinical details are given of five cases of blackwater fever. The disease is very common in Haut-Laos, but not very fatal, and the Annamites from Cochin China are much more subject to it than are the Annamites of Tonkin.

W. Y.

PARROT (L.). **Nouvelle observation algérienne de fièvre bilieuse hémoglobinurique.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Mar. Vol. 1. No. 1. pp. 59–63. With 1 chart in text.

Reference is made to a previous paper [this *Bulletin*, Vol. 6, p. 109] in which the author showed that blackwater fever is an important disease among Europeans of Algeria, not only on account of the number of cases, but also owing to their gravity. During the last six years the disease has not become less prevalent. Although exact figures are not available, the total cases between 1899 and the end of 1920 are estimated at a hundred. Details of one of the last cases are set forth according to the manner prescribed on the schedule devised by STEPHENS [this *Bulletin*, Vol. 5, p. 254].

W. Y.

MORIN (H. G.). **Quinine et fièvre hémoglobinurique.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1920. Dec. Vol. 18. pp. 139–147. With 1 chart in text.

A detailed account is given of a case of blackwater fever which exhibited haemoglobinuria on 12 occasions during a period of 26 days

The patient had been the subject of malaria for a long period, and the initial attack of blackwater followed the injection of a large dose (1 gm. or 1·5 gm.) of quinine. The alarming symptoms disappeared with symptomatic treatment, but intermittent fever reappeared. Quinine, either intramuscularly or orally, regularly produced a relapse of haemoglobinuria, but quinine alone did not appear to be the cause, since one of the most severe relapses occurred without the previous administration of quinine.

The history of this case is not without interest, the author writes, in that it illustrates the fruitlessness of quinine therapy. Analogous cases are common in tropical medicine; attention is drawn to the well-known fact that many creoles and old European and Asiatic residents are afraid to take quinine when they have fever. The colonial practitioner, as the result of experience, learns to respect the precepts of the old physician, and only administers quinine with a thousand precautions.

The author states, however, that he has treated men profoundly affected with malaria with massive doses of quinine, after the method prevalent in Macedonia, without ever producing haemoglobinuria; these patients were from a detachment of European soldiers who had been less than a year in Madagascar.

Wherein then lies the apparent discrepancy? The author believes that it is to be explained by the fact that the Madagascar cases were only recently infected with malaria, whereas the case detailed above and the great majority of those with which the ordinary Colonial practitioners have to deal are old standing cases. He observes, in support of this, that it has been noted that massive medication with neo-salvarsan is dangerous in old syphilitics and especially in old untreated cases.

W. Y.

Pelletier (J.) & Quemener. **Traitement de la fièvre bilieuse hémoglobinurique par des injections intraveineuses de cyanure de mercure.**—*Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. pp. 226–228.

The authors' attention has been arrested by two recent papers on blackwater fever, the one by Munoz recommending 1 cgm. of cyanide of mercury every 24 hours as treatment [this *Bulletin*, Vol. 15, p. 431], and the other by Noc drawing attention to the presence of spirochaetes (post-mortem) in the liver of a European who had died of blackwater fever [vol. 17, p. 369.]

Details are given of six cases of the disease treated with cyanide of mercury; all recovered.

The conclusion is that the drug has an excellent action in blackwater fever; under its influence the haemoglobinuria rapidly disappears. The favourable action of this drug seems to support the view that the disease is due to a spirochaete.

[It is necessary to point out yet once more that conclusions of this nature based on the observation of so few cases are entirely unwarrantable; no positive conclusion can be drawn from the fact that six cases recovered, when it is well known that 70 or 80 per cent. of all cases of the disease recover whatever treatment be administered.]

W. Y.

Wallace (A. F.). **A Note on the Treatment of Suppression in Blackwater Fever.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Oct. 20. Vol. 15. No. 4. pp. 129–130.

The attack of blackwater commenced on May 28, and the patient was first seen by the author the next morning. There was constant bilious vomiting and nothing was retained. Rectal salines were given for two days and then intravenous salines; up to June 2 over 7 pints had been injected. On June 3 the condition seemed hopeless, and from May 31 only 1⅞ oz. of urine had been voided. The author then tried large hot irrigations with normal saline with double-current rectal tubes, as recommended in Osler's "Practice of Medicine." Two thin oesophageal tubes (size 20) were stitched together side by side, the tip of one being 3 in. lower than the other, and these were then passed per rectum high up in the bowel. At first every hour, and later every four hours, 4 pints of saline, as hot as the patient could bear, were run in from a douche can. The urine steadily increased in volume day by day, and on June 3, 2 oz., June 4, 3¼ oz., June 5, 5 oz., June 6, 15 oz., June 7, 24 oz., June 8, 61 oz., June 9, 89 oz., and June 10, 146 oz. were passed.

The author is of opinion that the method should be tried in any case of suppression.

W. Y.

Thornhill (F. M.). **Malarial Hemoglobinuria.**—*New Orleans Med. & Surg. Jl.* 1921. Oct. Vol. 74. No. 4. pp. 224–232.

This paper was written 18 years ago and, it is stated in the preface, presents the views held on the subject commencing practically half a century ago.

W. Y.

Daleppa (K.). **Blackwater Fever in Khondmals, Orissa.**—*Indian Med. Gaz.* 1921. Aug. Vol. 56. No. 8. p. 299. With 1 chart.

Hargant (A. G.). **A Case of Blackwater Fever occurring in Mesopotamia.**—*Jl. Roy. Army Med. Corps.* 1921. Nov. Vol. 37. No. 5. pp. 384–386. With 1 chart in text.

UNDULANT FEVER.

Fleischner (E. C.), Vecki (M.), Shaw (E. B.) & Meyer (K. F.). **The Pathogenicity of** *B. abortus* **and** *B. melitensis* **for Monkeys. Studies of the Genus Brucella Nov. Gen. III.**— *Jl. Infect. Dis.* 1921. Dec. Vol. 29. No. 6. pp. 663–698. With 4 charts in text.

This is a continuation of previous work to show the relationship of *B. abortus* Bang to *B. melitensis* (using the authors' nomenclature) [see this *Bulletin*, Vol. 16, p. 412]. As few tests had been carried out on monkeys, these were used for the experiments, the clinical results of infection being observed, and the virulence of the organisms tested. The work done is fully described. The cultures of *B. abortus* were pathogenic to guinea-pigs, and this organism could not be separated from *melitensis* by morphology, culture, or ordinary serum tests. Intravenous injections in one monkey gave rise to a typical infection; in two others the results were less conclusive. When monkeys received with their food a *B. abortus* strain of low virulence, three out of six became infected, but two of the former had present in the gut an entozoal parasite, *Oesophagostomum*, which probably favoured infection. Guinea-pigs fed on the stools, however, did not contract the abortus infection. The higher the virulence of the strain, the quicker was the infection produced. The milk of artificially infected cows fed in large doses to four monkeys gave three negative results. Goats were infected and successive passages were made by injecting into the udders of other goats, converting a bovine strain into a caprine strain; the milk used for feeding gave partially successful results. From these experiments it appears that *B. abortus* infection is not readily caused in monkeys which are fed on naturally infected goats' milk, and it was proved that animals which did not become infected this way were not immune, as heavy doses of the organism given on carrots were infective. They found that monkeys could not be infected via the alimentary canal by a relative small number of *B. abortus*, even when the diet was continued for over 30 days, *a result which differs fundamentally from that obtained by the use of B. melitensis.*

A fact of great epidemiological importance is that calves which are exposed to infection during the first three or four months, and known to have ingested infected milk, become immune. Abortus serum contains both specific and non-specific agglutinins; it is necessary when carrying out tests to heat the serum as recommended by Nicolle for melitensis serum. These agglutinins are formed only in the presence of a definite infection; the use of killed autolysed abortion bacilli is antigenically ineffective in monkeys. The microscopical changes produced by *B. melitensis* or by a heavy abortus infection in monkeys resemble those of an early typhoid infection. In answer to the question, is *B. abortus* pathogenic to man? they say that at present it appears that it is non-pathogenic, though Mohler & Traum, by inoculating guinea-pigs, found *B. abortus* present in 1 out of 56 tonsils obtained from children, and Sedgwick and others found specific agglutinins for *B. abortus* in a small percentage of children examined. The authors tested 50 children with negative results, and Nicholl & Pratt in repeated examinations obtained no positive results.

The work is summarized as follows :—(1) Virulent strains of *B. abortus* in sufficiently large doses are pathogenic to monkeys ; (2) *B. melitensis* is far more invasive than *B. abortus*. One or two feedings of one-thousandth the amount necessary to cause an infection with *B. abortus* is sufficient in melitensis infection to parasitize a monkey.

P. W. Bassett-Smith.

KHALED (E.). **A Comparative Study of Bovine Abortion and Undulant Fever, from the Bacteriological Point of View.**—*Jl. of Hygiene.* 1921. Dec. Vol. 20. No. 4. pp. 319–329. With 2 charts.

The work was carried out at the Lister Institute. Thirty strains of the organisms were tested against rabbits' serum immunized with the three organisms, *melitensis*, *abortus*, and *paramelitensis*. No morphological distinction could be made between the three, described as small rods 3-5 μ long, with somewhat pointed ends, pleomorphic, the same strain showing bacilli, cocco-bacilli, and cocci, non-motile, and Gram negative. [It is important to remember that, as originally described by BRUCE, and as is generally known, the organism was 0·3 μ in diameter. This still remains good in freshly-isolated cultures.] Abortus infection is stated to be chiefly due to food infected from the placenta. The incubative period is 32–230 days. There is catarrh of the genital passages, loss of milk, and abortion ; the animals generally recover, but remain sterile or abort again. The disease is highly infective, and rapidly spreads through a herd, the males acting as " carriers " ; about 25 per cent. of animals are infected in England, many more on the Continent and America. This disease and undulant fever present a picture of bacteriaemia with a close similarity of the modes of infection and excretion of the organism, but the author is wrong when he states that in undulant fever enlargement of the testicle is found in a great proportion of the cases. As the morphological and cultural characters gave no distinctive differences, agglutinative tests were made with the following results :—

1. With melitensis serum, melitensis and abortus organisms agglutinated equally, paramelitensis less so.

2. With abortus serum the abortus titre was a little higher than the melitensis, and still more than the paramelitensis.

3. With paramelitensis serum, paramelitensis agglutinated up to 1/6,400, melitensis up to 200, and abortus to 100–200.

The four groups described by SHAW and FEUSIER were not substantiated [see this *Bulletin*, Vol. 16, p. 412]. Absorption tests showed that :—

1. When melitensis serum was fully absorbed with melitensis organisms all agglutinins for both melitensis and abortus were removed.

2. When melitensis serum was fully absorbed with abortus organism the results were similar.

3. When abortus serum was fully absorbed with abortus organism all agglutinins were again removed.

4. When abortus serum was fully absorbed with melitensis organism it failed to agglutinate with the melitensis strain but agglutinated the abortus strain to the full titre.

From this it is gathered that *B. melitensis* is a substrain of *B. abortus* ; the use of the generic term *Brucella* is advised for the group. With guinea-pigs the melitensis strains were about six times more virulent

than the abortus ones. A single cross immunization experiment with a monkey showed that inoculation of abortus into the animal protected it from an infection with a quantity of melitensis organism which produced a typical fever in a control monkey. In the author's opinion, there seems to be no reason, apart from the low virulence and the large dose which would be required, against a febrile affection being produced in man from ingestion of abortus-infected milk, but the fact remains that abortus-infected milk is common and undulant fever very rare in England; it is, however, possible that some slight immunity may be acquired by constant ingestion of infected milk. No definite conclusion is drawn as to whether the species are one and the same, but the cross immunity experiment favours this view.

[This investigation in almost all points corroborates the work done on the subject in America, and the group seems to be a very definite one.]

P. W. B-S.

Zuccarelli (S.). **Fièvre méditerranéenne ou de Malte en Corse.**—*Bull. Acad. Méd.* 1921. Dec. 20. Vol. 86. 3rd Ser. No. 42. pp. 423–425.

Twenty years ago undulant fever was very rare in Corsica, but in 1912 the author found that it had spread widely and was a source of great danger; he publicly drew attention to the fact and recommended preventive measures. It is now endemic all over the island, and he points out that the same measures should be carried out in Corsica to eradicate the disease as were used so successfully by Sergent in Algeria.

P. W. B-S.

Cordeiro (Filipe Pinto). **Existe febre de Malta em Goa?** Does Undulant Fever occur in Goa?]—*Bol. Ger. Med. e Farmacia.* Nova Goa. 1919. July. Vol. 5. No. 7. pp. 255–256. (Discussion p. 256.)

Undulant fever has only recently been recognized—by the agglutination test—in Goa. Cases of prolonged fever have been regarded usually as typhoid and kept on a low diet, with death as a frequent sequel. Other diagnoses were rheumatic fever or tuberculosis. The suggested source is goats from Gajarat, the milk of which is drunk.

A. G. B.

Rémond (A.) & Minvielle. **Note sur un cas de fièvre de Malte.**—*Bull. Acad. Méd.* 1921. Oct. 4. Vol. 86. Ser. 3. No. 31. pp. 135–136.

The patient was a Spaniard, aged 36, a wood-cutter by trade. A possible source of infection was the milk (always supposed to be boiled) of a goat kept in the house. The chief clinical peculiarities were, the sudden onset with pulmonary symptoms, the absence of pains and sweats and of true apyrexial periods. The diagnosis was confirmed by a positive blood culture, and the high agglutination reaction of the serum (1 in 12,000) carried out at the Pasteur Institute, Paris.

P. W. B-S.

Cignozzi (Oreste). **La coxoposite nella febbre maltese simulante la tubercolosi dell'anca.** Arthralgia of the Hip in Undulant Fever simulating Pott's Disease.]—*Riforma Med.* 1921. July 16. Vol. 37. No. 29. pp. 674–675.

The occurrence of suppurative conditions associated with undulant fever has interested the author since 1911. He now describes two cases of children, aged 7 and 8 respectively, who had prolonged fever with hip joint symptoms, and positive serum reactions having a titre of 1 in 100 with the *M. melitensis*. He emphasises the importance of serum tests, in such cases which simulate Pott's disease, and the value of serum therapy.

P. W. B-S.

Lombard (Pierre) & Béguet (Maurice). **Orchite suppurée due au *Micrococcus melitensis*.**—*Presse Méd.* 1921. Sept. 21. No. 76. pp. 753–754.

A metastatic inflammation of the testicle and epididymis occurs in about 6 per cent. of undulant fever cases; it is quite exceptional for suppuration to follow. Five examples have been recently recorded, but only in the authors' case was a complete bacteriological examination made, as a result of which the *M. melitensis* was isolated in pure culture from the testicular pus. The affected organ was removed, antimelitensis vaccine was given, and the patient left the hospital cured. Tuberculosis was negatived by animal experiment. A full description is given of cases described by Cantaloube and Cassuto. Suppurative orchitis is a very grave complication, as separate foci tend to be distributed; the gland is practically always destroyed and the amount of pus may be very large. During the course of the fever the diagnosis is easy, but after convalescence it is more difficult, as there are no specific signs beyond those obtained by bacteriological methods. [The micrococcus produces in tissues, first, signs of local irritation, then fibrosis, which may go on to necrosis or formation of cold abscesses. Such abscesses have frequently been described over costochondral joints from which no organism, or only the *M. melitensis*, has been recovered. This occurrence is rare in the testicle. Recent work has shown that the *M. paramelitensis* is more pyogenic than the *M. melitensis*, and it is possible that this case from Algiers was due to the former organism.]

P. W. B-S.

Carini (Alfredo). **Phenololipoid N. in Experimental Infection by *Micrococcus melitensis*.** (**Chemotherapic Notes.**)—*Jl. Trop. Med. & Hyg.* 1922. Jan. 2. Vol. 25. No. 1. pp. 1–2.

Piazzo's phenololipoid N. is supposed to have both antitoxic and antibactericidal properties. In cases of undulant fever these two factors are required for successful treatment. The author found that in vitro short exposures of the organism to moderate dilutions were effective, viz., 15 minutes of 1 in 20. Guinea-pigs which had received lethal doses of the *M. melitensis*, when treated with 1 cc. of a 10 per cent. solution of the drug in oil, given subcutaneously for an average of eight days, nearly all survived and appeared to have been

cured. It was therefore considered proved that phenololipoid N. in experimental infections of *M. melitensis* possessed energetic antibactericidal and antitoxic properties.

[These experiments on guinea-pigs will require to be repeated on monkeys before any definite conclusions as to the curative value can be reached.]

P. W. B-S.

Burnet (E.). **Sur un nouveau procédé de diagnostic de la fièvre méditerranéenne.**—*C.R. Acad. Sci.* 1922. Feb. 6. Vol. 174. No. 6. pp. 421–423.

The author's method is an intradermal inoculation of a filtrate of a culture of the *M. melitensis*, which has been shown to give specific reactions in guinea-pigs and man. In eight cases of undulant fever proved by serum reaction or blood culture the result was distinctive, in acute cases from the 12th to the 35th day, and in convalescents up to three and a half months ; in a cured case after 18 months the result was negative. The filtrate is made from broth cultures, preferably one month old, passed through a Chamberland bougie ; this is only slightly attenuated if boiled for one minute, and phenolizing does not reduce its activity. From seven hours after the inoculation of one drop intradermally, there is redness, slight *local oedema*, and perhaps a little pain ; the zone extends 4–6 cm. and has a definite margin. In control cases subcutaneous inoculation caused slight oedema and pain, but the intradermal no reaction. The test is looked upon as simple and sure ; it is always applicable and quite free from danger. Further work is being carried out on these lines on goats, and the questions of duration of activity of the filtrate, its preservation, sensibility of subjects, and the anatomical and physiological characters of the reaction have still to be studied.

[The filtrate would contain the exo- and endotoxins of the *M. melitensis* plus proteins from the broth ; saline emulsions from agar cultures would probably be better.]

P. W. B-S.

Tripputi (Vincenzo). **Sopra un caso di infezione associata tifo-melitense.**—*Pediatria.* 1922. Feb. 1. Vol. 30. No. 3. pp. 129–133. With 1 chart.

The author reports a case of mixed infection of typhoid and undulant fever, proved by the isolation of *B. typhosus* from the blood and *M. melitensis* from the urine, with their specific agglutinations. The patient was a child aged 11, a resident of Palermo. Treatment was mainly by vaccines, antityphoid given intravenously (4), followed by antimelitensis given subcutaneously. Improvement was rapid and at the time of this record there was no relapse.

P. W. B-S.

BOOK REVIEWS.

SELWYN-CLARKE (P. S.). **A Monograph on Smallpox in the Negro and Negroid Tribes of British West Africa, with Special Reference to the Gold Coast Colony.**—74 pp. With 1 plate and 1 chart. London: John Bale, Sons & Danielsson, Ltd., 83-91, Great Titchfield Street, W.1.

Medical knowledge always appears to progress irregularly—great discoveries are made, enthusiastic application ensues, followed by long periods when, investigators resting on their oars, the boat of knowledge drifts backwards and forwards on the tide of personal opinion and no progress can be recognized. Too often do we continue to accept statements and theories without submitting them to rigid criticism in the light of data obtained under perhaps some slightly varying conditions. The study of such diseases as pneumonia, typhoid, pellagra and syphilis among natives of tropical countries has already yielded much of value. For such reasons Dr. Selwyn-Clarke is to be congratulated on having seized the opportunity presented by an outbreak of smallpox in Accra during 1920 to put on record his observations on that disease and the problems involved in dealing with the epidemic, and we welcome the Monograph, originally presented as a thesis for the Doctorate of Medicine of London University, in published form.

He has put on record his clinical findings regarding the 264 cases of smallpox among natives which came under his notice, and has used this information to make a comparison between the disease as observed among Gold Coast natives and as described in other countries, while the latter half of the monograph deals with administrative provisions and preventive measures.

In the first place this essay will carry conviction as to the necessity for reform in administrative provisions. The Vaccination Ordinance was not in force in the early part of the year 1920, with the result that there was a highly susceptible community. There was no Infectious Diseases Notification Ordinance, and compulsory notification by the general practitioner and others was only enforced after an order in council under the Quarantine Ordinance had been made. There was a non-sufficient sanitary substaff, with the result that a case of smallpox lay hidden in a native hut near the market-place for three weeks before discovery, a case which was responsible for the infection of 68 other persons. The supply of lymph from England was inadequate. Dr. Selwyn-Clarke's account of this epidemic will have brought these questions to the notice of responsible authorities.

The administrative provisions and preventive measures have, however, little general interest. They must depend, in dealing with epidemic disease in native populations, so greatly on local conditions and call for imagination and ingenuity on the part of the officials who have to take action.

The author found that desiccated lymph was practically useless, but had good results with lanolated vaccine lymph used within two weeks, and since the beginning of the epidemic to the time of writing he had seen vaccination carried out with success in some 90 per cent. of the total inhabitants, numbering nearly 80,000.

The statistics of the epidemic show that of the 264 cases, 8 were examples of Purpura variolosa, *i.e.*, 3 per cent.; none of these had previously been successfully vaccinated; 7 of them died. There were 6 cases of Haemorrhagic pustular smallpox (2 per cent.), none of whom had been vaccinated; mortality 100 per cent. 199 cases of Variola vera were seen (75 per cent.), with a mortality of 27·6 per cent.; none of these had been successfully vaccinated, except 3, in whom the point was doubtful. Of these 199,

125 had confluent smallpox, with mortality of 37·6 per cent., and 74 showed a discrete eruption, with mortality of 10·8 per cent. 51 cases of Varioloid were noted (19·3 per cent.), 66·6 per cent. of whom had been vaccinated, and no deaths occurred in this group. Of the 64 cases with fatal issue, none had been successfully vaccinated, while of 34 cases previously vaccinated, 12 prior to exposure and 22 subsequent to exposure to infection, none died and all were modified. No case of Variola sine eruptione was noted and attention is drawn to the fact that no cases of Alastrim were seen. A high attack rate and mortality were found among children under five years of age; between 10–15 years, the mortality was only 3·2 per cent., but among the individuals included in the age period 35–45, it rose to 41·4 per cent. A single instance of second attack was met with in an old man of 65, who had been vaccinated seven years previous to the second attack, the first attack being at the age of 20.

Dr. Selwyn-Clarke concludes that the general symptomatology varied little from the disease in Europe and that complications and sequelae did not differ materially in the native as compared with the European, but he points out that initial rashes in natives of West Africa are rare, that the secondary rise of temperature is commonly absent, and that patients remain without mental impairment till the hour of their death, and he lists among complications bronchitis, broncho-pneumonia, enteritis, boils, deep-seated abscesses, sloughing of skin, keratitis, and single cases of arthritis and parotitis. He refers to the difficulty in differential diagnosis in natives, and to the use made of vaccination as an aid. The effect of irritation due to mode of dress or other cause in affecting the distribution of the eruption is alluded to in a striking manner, and a number of cases illustrating the results and effects of vaccination at different stages of incubation are interesting and parallel a similar set of experiments made by the reviewer among African natives 10 years ago.

One would like to suggest that the findings in the epidemic under review are not necessarily a criterion of what may be met with in another visitation. The present writer has seen epidemics of smallpox among natives in East Central Africa which varied very greatly in virulence and infectivity, not only in different years, but in adjoining areas at the same time. As an instance, in one epidemic, some 50 infants under two years of age, and breast-fed by mothers, who were at the time immune (due to having had the disease or been vaccinated), contracted smallpox with no mortality among them, while the death-rate among the older inhabitants was considerable. At the time a number of the points alluded to by Dr. Selwyn-Clarke were recorded: cases of second attack, the apparent rarity of initial rashes, etc. A single case of Variola sine eruptione was seen, and alastrim is, of course, found in Central Africa, and is also known to occur in West Africa.

It is to be hoped that Dr. Selwyn-Clarke will have the opportunity of studying any further epidemics which may occur, and the whole question of the degree of immunity and its relation to smallpox, vaccinia and alastrim is one which invites further research.

Hugh S. Stannus.

VAN LOON (F. H.). [In Dutch and English]. **Het Krankzinnigenvraagstuk in Atjeh.—The Problem of Lunacy in Acheen.** —*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1920. Pt. 10. pp. 2–49. With 1 plate.

With the whole question of the treatment of Insanity so much to the front in the public mind, with the ears ringing with the criticisms raining down on such measures as are in force in this and other civilized European countries, one can experience a great feeling of relief and reassurance by turning to Dr. van Loon's article on "The Problem of Lunacy in Acheen"; for here one is taken right back to the beginning of things psychiatrical, the author is treading virgin soil, and the story he has to tell is most interesting and instructive.

Acheen and its Dependencies comprise the territory, under Dutch administration, forming the northern extremity of the island of Sumatra. The district is populated by a fairly distinct race, the Achinese, with a certain admixture of Malays, Javanese, Chinese, etc. Apparently the Achinese were of a certain degree of cultivation, they had a fairly well organized system of native rule by Chiefs, they were united for purposes of defence, and, in addition to the purely agricultural life, they showed a marked artistic trend in the manufacture of ornamental cloths, etc. For the last fifty years there has been a state of open warfare directed against the Dutch attempts to hold and pacify the country, and only recently has the Dutch administration become at all settled.

As their hold on the land became more secure, the Dutch authorities established various military and civil hospitals and prisons at the central administrative points, and these prisons had been used for segregating, not only the criminal offenders, but also those mental cases whose disorderly conduct was so gross as to make them a source of danger to the community at large. Originally, no doubt, such cases were derived from very localized areas of administration and were extremely few in number, but as the process of pacification went on, the native chiefs of the interior came to realize how comfortably they could get rid of their troublesome lunatics, so the cases began to come in more and more from ever widening areas of the country.

It is interesting to note that there was no question of anything being done, in the way of help or treatment, for the individual case; the matter was simply one of social convenience, and the situation developed until, finally, it was the extraordinary accumulation of mental cases in the various gaols, and the nuisance they constituted in regard to the administration of those institutions, that called the attention of the Governor of Acheen to the matter, and led to Dr. van Loon being directed to make a tour of inspection with a view to recommending some solution of the problem.

In all, the author examined some 200 odd cases out of the 1,100 which had been reported, of which the great bulk were made up by Dementia Praecox, General Paralysis and other Syphilitic Cerebral conditions, and Acute Maniacal and Confusional states. All forms of mental disorder known in European countries were represented, and on the whole, the type of conduct exhibited and the comparative frequency of each variety conformed to the general experience of mental disorder in any part of the globe. A few of the cases he examined he found to be quite recovered. In one or two such instances it was clear that the patient had been well for some years, but the local authority of the institution of detention would not take the responsibility of releasing the patient; on the other hand, however, several cases were brought up to him which had been discharged from other institutions and had obviously not recovered.

While the condition of the patients confined in the prisons or in the refractory blocks of the military hospitals was bad, that of the unfortunate patient who became violent in some area where there was no detaining institution was infinitely worse. The practice in such a case was to lock the patient up in a pillory or in a block, which kept the body in a bent attitude and therefore prevented any danger of assault upon any other member of the community; the block or pillory would then be chained to a post or tree and the patient left to face the rest of his or her life under those conditions. The author saw several cases which had been kept pilloried in this way continually for periods of from two to thirteen years on end, and in which there were marked contractures and wasting of limbs due to the enforced and constrained attitudes adopted; indeed it appeared to him that, once a patient was locked up in this way, there was a strong probability of the limbs never again being restored to freedom by release.

Dr. van Loon reserves his decision as to whether the actual number of insane in Acheen is in excess of expectation: he feels that on the one hand the native chiefs may have included only the openly dangerous cases in their lists, in which event the true number of mentally disordered must be much larger than appears and would certainly be excessive; on the other hand, however, he feels that it is quite possible that they are shrewdly including all sorts of troublesome people whether insane or not. In any case, he sees a striking need for the provision of a properly equipped and staffed asylum for the undoubted large number of untreated and uncared-for insane of the country.

In his opinion, the years of suppressive warfare carried on by the Dutch in establishing their hold on the country have resulted in the elimination of the best of the native population. The years of chronic terror and disturbance have not been without effect on the mental stability of a race which is normally emotional and highly strung. Also, the mixing of East and West, as usual, has resulted in the native taking to the worst of the habits of the newcomer, so that the former active and alert Achinese has degenerated into the present indolent, dull, easy going, and dissolute native. The author feels that it is due from the Dutch authorities, as having been the main cause of introducing these degenerative factors, to take steps to deal with the situation and to see that proper facilities are provided, in accordance with the more modern and enlightened views, for the treatment of such individuals under their protection as are unfortunate enough to develop mental disorder.

The article is well written and descriptive. In the English translation there are a few errors of grammar and spelling which could easily have been rectified; these do not, however, interfere with the easy reading and general sense of the production, and the article will repay in its interest for the little time required for its perusal.

Thomas Beaton.

MARTINI (E.). **Berechnungen und Beobachtungen zur Epidemiologie und Bekämpfung der Malaria auf Grund von Balkanerfahrungen.** [Computations and Observations relating to the Epidemiology and Prophylaxis of Malaria based on Balkan Experiences.]—108 pp. With 6 text figs. 1921. Hamburg: W. Gente, Wissenschaftlicher Verlag. [Price 15 Mks.]

In essentials this is a mathematical treatise aimed at establishing the writer's well-known views on the unity theory of malaria. But if one penetrates the forest of algebraical formulae, the soil from which these equations rise is a curious one. It is assumed that for statistical purposes it is sufficient to treat as equivalents primary infection and first treatment, and again relapse and second treatment. But there are grave objections to considering as synonymous either infection and initial symptoms, or relapse and secondary attacks, quite apart from the dissociation which must have occurred in the Balkans between symptoms and treatment. Martini himself emphasizes the fact that there occurred in the Balkans cases in which illness and treatment were postponed for months after infection, although it is perhaps unlikely that they were sufficiently numerous to vitiate statistics seriously. On the other hand, to assume, without evidence, that, where infection was so readily obtainable as it was in the Balkans, every case of second illness was relapse and not a fresh infection is quite unwarrantable. It seems inconceivable that many of these consecutive illnesses were not due to consecutive infections. The basis from which this part of the equations arises is accordingly a precarious one. Martini is convinced, nevertheless, that the facts can be made to fit the unity theory. Possibly. But the theory would be more convincing did it follow naturally from a consideration of all the facts, and did its exponents agree among themselves upon, for instance, such an essential matter as the possibility of primary latency of infection.

The cause of latency or activation of the benign tertian form is held to lie in the action of sunlight on host or parasite, much sunlight bringing about more relapses, and so more primary cases in the spring, and explaining, at least partially, the heavier infection in southern lands and the greater malarial incidence on the fair than on the dark skinned. There is none of these statements or conclusions which has not been emphatically contradicted. A table details excellently the differences in form between the two tertian parasites, both in the mosquito and in man.

Clayton Lane.

Indian Science Congress Handbook, for the use of members attending the ninth meeting to be held at Madras from the thirtieth of January to the fourth of February, 1922. Edited by NEWCOMB (Clive) [Chemical Examiner, Madras].—x + 165 pp. With 1 folding map. 1921. Madras: Printed at the Madras Diocesan Press.

This hospitable little book, addressed particularly to the members of the Indian Science Congress now visiting Madras for their ninth assemblage, contains a large amount of concise and precise information of general interest.

In its historical chapters we are reminded that Fort Saint George, the nucleus of the old city of Madras, was founded in 1639; and that in the vicinity of the Church of St. Mary, the oldest British building in India, built by the "devotion of the indomitable Sir Streynsham MASTER," and consecrated (by a proxy for the Bishop of London, whose diocese then included India) in 1680, there still stands the tombstone of David YALE, son of Elihu Yale, the founder of Yale University. The bible used by Streynsham Master, and the silver alms-dish given by Elihu Yale, who was Governor of Madras in 1687, are still in the church; and the church registers contain all the births, marriages and deaths from 1680 to the present time. In the review of interesting historical events we find mention also of Pollilore, the scene of Baillie's "famous last stand . . . . where his last 500 men, without ammunition, repelled thirteen attacks of Hyder Ali's army of 86,000 men before finally surrendering."

The present city and corporation of Madras are humourously touched off by Mr. J. C. MOLONY, who remarks that the "Corporation might find scriptural warrant for being puffed up, on the score that all men, or at least a good many men, daily speak ill of it." The municipal area, however, is large—some 27 square miles—and the municipal income is small—less than 37½ lakhs of rupees (under £250,000)—yet the much-abused corporation can contend that every day of the year it provides more than half a million persons with generally good drinking water—more than 25 gallons per head in a continuous supply—and removes 350 tons of rubbish from the streets, and carries away nine million gallons of sewage from human habitations, and maintains about 300 miles of metalled roads, which are now in course of being lighted by electricity.

From the engineer to the corporation, Mr. J. W. MADELEY, we learn some particulars of the city water-supply and waterworks. The artificial lakes that, among other useful purposes, supply Madras with water, are fed from a catchment area of about a thousand square miles. After screening and rough filtering, the intake destined for the city is led in a culvert seven miles long to the sand filters, consisting individually of a layer of clean siliceous river sand 28 inches deep, over two layers, each two inches deep, of broken granite, below which are brick drains, composed of two layers of pressed bricks. From the filters the water flows into underground tanks and gravitates thence to the pumping station. The filters generally work well, but since sand filtration cannot be trusted to remove all disease-germs it has been decided to adopt some supplementary process of chlorination, and experiments are now afoot to that end.

The port engineer contributes a short account of the Madras harbour-works, which have had a somewhat chequered history since their origination in 1875. The last disaster, in 1916, was a cyclone of such violence that it swept away a 5,000-ton monolithic bastion with about 130 feet of breakwater.

Apposite authorities describe the Museum and Public Library, and the educational machinery, both general and technical. There are in and about the city 10 colleges, including the Medical College, the College of Engineering, the Teachers' College and the Law College, affiliated to the University. There are also 51 secondary schools (31 for boys and 20 for girls), and several technical schools, including a medical school for training medical subordinates, and a veterinary college. The Medical College was opened as a medical school in 1836, and became a constituent college of the University in 1877; its more important recent additions are the laboratories of physiology, hygiene and bacteriology, biology, and physics; the present staff consists of 13 professors, 2 lecturers, 24 assistants to professors and 12 demonstrators; and the staff administers seven separate departments, three of which are for post-graduates.

Major CUNNINGHAM, I.M.S., gives some interesting particulars of the King Institute of Preventive Medicine, which, beginning as a depot for the supply of vaccine lymph to the Madras Presidency, has now developed further into a bacteriological and a public health laboratory for the Presidency. The Institute is well known to the world through the work of Colonel KING on vaccine, of Colonel CLEMESHA on water purification in the tropics, and of Majors CHRISTOPHERS, PATTON and CRAGG on medical zoology.

In an interesting chapter on the history of biology in Madras we are reminded by Dr. F. H. GRAVELY that the old East India Company was not unmindful of the claims of science, since some of the most famous names in the annals of Indian natural history are those of men who began their career as surgeons and official naturalists to the Company. Several of the most celebrated of these were connected with the Madras establishment, to wit, Patrick RUSSELL (1782), famous for his work on Coromandel serpents and Coromandel fishes; William ROXBURGH, Father of Indian Botany, whose works on the Flora of Coromandel and *Flora Indica* still preserve their savour; Robert WIGHT (1819), a botanist of almost equal class, whose work has equal endurance; T. C. JERDON (1835), whose name is still a household word among ornithologists and mammalists; and Francis DAY (1852), author of the classical volumes on the Fishes of India. Among other Madras worthies whose name will not die stands Colonel BEDDOME, of the Indian Army, who wrote what is still the standard work on the ferns of India.

Mr. HORNELL, Director of Fisheries, supplies a chapter full of information and suggestion on some problems of marine zoology in South India, touching, *inter alia*, on distribution, commensalism, and parasitism. It is interesting to learn that experiments are being carried out for acclimatizing in inland waters some of those marine fishes that, having estuarine proclivities, may be assumed to possess some occasional and incipient tolerance of fresh water, and that in the case of two such species the experiments have been successful. Similar experiments with estuarine crustacea are projected.

Other chapters of well sustained interest deal severally with the Anthropology of South India—a field of peculiar richness and diversity, Prehistoric Archaeology in Madras, and the Geology of the Presidency; and finally there is an account of the Agricultural College at Coimbatore.

It is to be assumed with some confidence that the members of the Indian Science Congress will have been edified and impressed alike by the contents of this wonderful little packet of assimilative instruction and by the inspiration that conceived it and the imagination that gave it shape.

A. Alcock.